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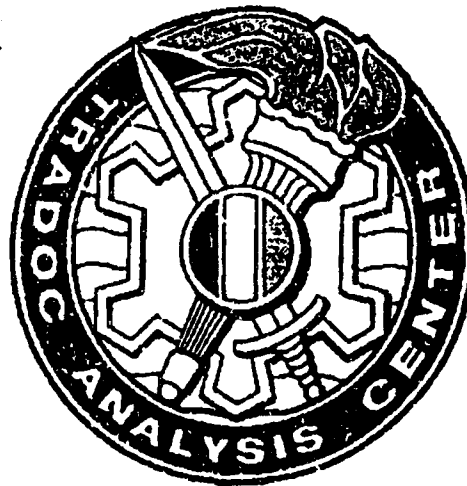


**NON-LINE OF SIGHT -  
COMBINED ARMS (NLOS-CA)  
MANPOWER, PERSONNEL AND  
LOGISTICS IMPACT ANALYSES (LIA)**

**VOLUME I**

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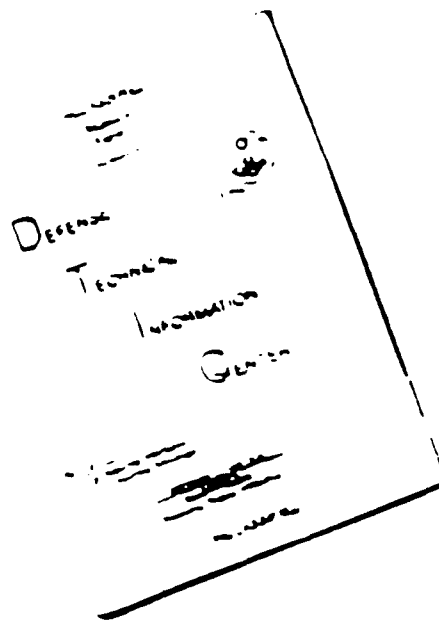
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**NON-LINE OF SIGHT - COMBINED ARMS (NLOS-CA)  
MANPOWER AND PERSONNEL ANALYSIS (MPA)  
AND LOGISTICS IMPACT ANALYSES (LIA)**

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**NON-LINE OF SIGHT - COMBINED ARMS (NLOS-CA)  
MANPOWER AND PERSONNEL ANALYSIS (MPA)  
AND LOGISTICS IMPACT ANALYSES (LIA)**

**STUDY SUMMARY**

**1.1 INTRODUCTION.** A continuing need exists to enhance the ability of the Army to engage enemy armor, high-value ground targets, and rotary-wing aircraft. The Non-Line of Sight - Combined Arms (NLOS-CA) Weapon System (WS) is intended to fulfill this requirement.

**1.2 PURPOSE.** The purpose of these analyses was to identify manpower, personnel and logistics impacts caused by fielding the NLOS-CA WS. These analyses were conducted as integral parts of the NLOS-CA Cost and Operational Effectiveness Analyses (COEA) study. The COEA Study Plan (SP) was prepared by the TRADOC Analysis Center (TRAC) - White Sands Missile Range (WSMR), NM (the study agency). LIA and MPA SPs are included in the COEA as Appendices C and E, respectively. The results of both analyses are included in Volume I of this report. Volume II, the administrative audit trail, is archived at Fort Lee. These analyses were conducted under the supervision of TRAC - Fort Lee (TRAC-LEE), VA. The results of the analyses were provided to TRAC-WSMR for integration into the COEA and for use as source documents for the Milestone (MS) II Decision Review (MDR).

**1.3 SCOPE.** This study assessed the logistics, manpower, and personnel impacts of the two alternatives for the NLOS-CA WSs. Those impacts were assessed for a Brigade slice or one NLOS-CA company. An assessment of physical requirements and training prerequisites for system operators was also conducted as part of the MPA.

**1.4 ALTERNATIVES.**

**1.4.1** The Base Case is the current force structure. This structure was not included in the study.

**1.4.2.** There are two alternatives to the Base Case - the NLOS-CA and the Long Range Smart Mortar (LRSM). There is no predecessor system for either alternative.

**1.4.2.1 Alternative 1.** The NLOS-CA is Alternative 1. This system consists of a gunner's station and fiber-optic guided missile (FOG-M) launcher sub-system mounted on a High Mobility Multipurpose Wheeled Vehicle (HMMWV) in both heavy and light configurations. The missiles will be stored, transported and loaded in a unitized launch-storage container with a six-round capacity. Cameras and sensors in the FOG-M enable the gunner to identify and engage targets at a range of several kilometers while remaining within the protection of cover. The NLOS-CA will be a Brigade asset which will receive targeting information from the Brigade Tactical Operations Center (TOC). The WS will be fielded as a company assigned to both light and heavy brigades.

1.4.2.2 Alternative 2. The LRSM is Alternative 2. This is a notional system. For this study, it is defined as the 120mm, Battalion Mortar System (BMS) now in the field, but armed with precision-guided mortar munitions. Employment and doctrine for the LRSM have not been formally defined. For this study, LRSM will replace NLOS-CA systems one-for-one in NLOS-CA companies. NLOS-CA Operational Mode Summary/Mission Profile (OMS/MP) and operational concepts will apply to the LRSM. This alternative was studied in two versions. The light version will be transported in a HMMWV and unloaded manually for firing. The heavy version will be mounted in the M1064, M113A derivative, tracked carrier designed for the 120mm BMS.

## 1.5 TECHNICAL APPROACH

### 1.5.1 Logistics Impact Analysis (LIA) Essential Elements of Analysis (EEAs):

1.5.1.1 EEA 1. What are the supply differences between the alternatives?

1.5.1.2 EEA 2. What are the maintenance differences between the alternatives?

1.5.1.3 EEA 3. What are the transportation differences between the alternatives?

1.5.1.4 EEA 4. What are the Combat Service Support (CSS) Force Structure differences between the alternatives?

1.5.1.5 EEA 5. What are the differences in Reliability, Availability and Maintainability (RAM) between the alternatives?

1.5.1.6 EEA 6. What are the differences in transportability and deployability between the alternatives?

1.5.1.7 EEA 7. What are the Manpower and Personnel (MP) differences between the alternatives?

### 1.5.2 Manpower/Personnel Analysis EEAs.

1.5.2.1 EEA 1. What are the MP Force Structure requirements for the alternatives?

1.5.2.2 EEA 2. What are the personnel requirements by Military Occupational Specialty (MOS) and grade for the alternatives?

Assessment of these EEAs was based on analysis of 27 Measures of Performance (MOP) and Measures of Effectiveness (MOE). The analyst ranked the alternatives across multiple levels of hierarchical criteria. The methodology is discussed in detail in Appendix G of this report. The alternatives were compared for each MOP and MOE. MOPs and MOEs were compared for their relative importance to each sub-analysis area. In turn, the sub-analysis areas were compared for their influence on the

logistics impact of each EEA. Finally, the relative influence of each EEA on the logistics impact was established.

1.5.3 **RESULTS.** The results of this analysis are summarized in Table 1.

**TABLE 1**

**LOGISTICS IMPACT**

Alternative 1 (NLOS-CA) versus Alternative 2 (LRSM)  
(X = Greater Logistics Impact, 0 = Equal Logistics Impact)

|      |                     | NLOS-CA | LRSM |
|------|---------------------|---------|------|
| GOAL | LOGISTICS IMPACT    | 0       | 0    |
| EEA1 | SUPPLY              |         | X    |
| EEA2 | MAINTENANCE         | X       |      |
| EEA3 | TRANSPORTATION      | 0       | 0    |
| EEA4 | CSS FORCE STRUCTURE | 0       | 0    |
| EEA5 | RAM                 |         | X    |
| EEA6 | DEPLOYABILITY       | 0       | 0    |
| EEA7 | MANPOWER/PERSONNEL  | 0       | X    |

1.5.3.1 The table above portrays absolute differences in relative logistics impact. Analysis described in the report discusses the magnitude and quality of these differences.

1.5.3.2 Logistics Impact - Alternative 1 versus Alternative 2.

A. The overall Logistics Impact, i.e., logistics burden, of Alternative 2 is marginally greater than that of Alternative 1.

B. The impact is greatest in the Supply EEA. The LRSM firing rate is at least twice that of the NLOS-CA. This drives a higher ammunition supply requirement. The heavy version of the LRSM is tracked, thus requiring more fuel. This is further increased by the higher usage rates applied to the heavy scenario.

C. The NLOS-CA requires more maintenance support. Under a two-level maintenance concept a Direct Support (DS) contact team replaces any unit maintenance. This significantly increases workload at that level and may represent some risk in the maintenance supportability area.

D. The NLOS-CA is electronics-intensive and will require Test, Measurement, and Diagnostic Equipment (TMDE) from division assets that already support other systems. The LRSM has very little requirement for WS maintenance in the field.

E. The LRSM is fully interoperable within the present four-level maintenance system.

1.5.3.3 Measure of Performance (MOP)/Measure of Effectiveness (MOE) Analysis. Table 2 summarizes the significant differences in logistics impact at the MOP/MOE level of analysis.

TABLE 2

MOP/MOE COMPARISON SUMMARY

| NLOS - CA                   | COMPARISON                                 | LRSB                        |
|-----------------------------|--|-----------------------------|
| Fuel Gal Per Day            | LRSB Logistics Burden Greater Than NLOS-CA | Fuel Gal Per Day            |
| Fuel Tons Per Day           | LRSB Logistics Burden Greater Than NLOS-CA | Fuel Tons Per Day           |
| Ammo Tons Per Day           | No Significant Difference                  | Ammo Tons Per Day           |
| Ammo CUFT Per Day           | No Significant Difference                  | Ammo CUFT Per Day           |
| Round Dimensions            | No Significant Difference                  | Round Dimensions            |
| Pallet Size                 | No Significant Difference                  | Pallet Size                 |
| Stowed Rounds               | No Significant Difference                  | Stowed Rounds               |
| Material Handling Equipment | NLOS-CA Logistics Burden Greater than LRSB | Material Handling Equipment |
| Storage                     | No Significant Difference                  | Storage                     |
| TMDE                        | NLOS-CA Logistics Burden Greater than LRSB | TMDE                        |
| Maintenance Concept         | NLOS-CA Logistics Burden Greater than LRSB | Maintenance Concept         |
| MTBOMF                      | No Significant Difference                  | MTBOMF                      |
| MTBUMA                      | No Significant Difference                  | MTBUMA                      |
| MTTR                        | No Significant Difference                  | MTTR                        |
| MR                          | LRSB Logistics Burden Greater Than NLOS-CA | MR                          |
| DPAMMH                      | No Significant Difference                  | DPAMMH                      |
| Ao                          | No Significant Difference                  | Ao                          |
| Fuel Trucks Per Day         | No Significant Difference                  | Fuel Trucks Per Day         |
| Ammo Trucks Per Day         | No Significant Difference                  | Ammo Trucks Per Day         |
| Deployability               | No Significant Difference                  | Deployability               |
| Recoverability              | No Significant Difference                  | Recoverability              |
| EOD                         | No Significant Difference                  | EOD                         |
| Standardization             | No Significant Difference                  | Standardization             |
| Interoperability            | No Significant Difference                  | Interoperability            |
| Manpower                    | No Significant Difference                  | Manpower                    |
| Personnel                   | No Significant Difference                  | Personnel                   |

Although overall logistics impact is almost equal, there are significant differences in impact in fuel consumption and Maintenance Ratio (MR), material handling equipment (MHE), TMDE and maintenance concept. These differences are as follows:

A. Fuel Consumption and Maintenance Ratio (MR). The M1064, tracked carrier used in the heavy configuration of LRSM accounts for both greater fuel consumption and MR for the LRSM versus the NLOS-CA.

B. MHE. The six round missile storage/launch containers require on-board MHE for loading and downloading NLOS-CA missiles. The dimensions and weight of the containers will also require the availability of MHE throughout the ammunition pipeline. These requirements represent a significant logistics impact for the NLOS-CA versus the LRSM which requires no special or additional MHE for ammunition handling.

C. Maintenance Concept. The stated maintenance concept for the NLOS-CA does not provide organic assets for unit level maintenance on the NLOS-CA gunner's station. Unit level maintenance (Line Replaceable Unit (LRU) diagnosis, remove and replace) will be performed by the Forward Maintenance Teams from the DS Organization. This will increase the workload of DS maintainers who are already supporting other WSs throughout the Brigade area of operations.

D. TMDE. The electronics-based NLOS-CA gunner's station requires TMDE support for LRU diagnosis and repair. Although, the estimated TMDE workload is not significant, it represents an additive requirement for another Test Program Set (TPS) and an additional burden on a critical and heavily used maintenance asset.

E. Manpower. Estimated manpower requirements for both NLOS-CA and LRSM are similar. The relative logistics impact is minimal, however, because no "bill-payer" system has been identified, all manpower requirements represent a net addition to current level.

1.5.3.4 Operator Training Pre-Requisite Analysis. A high level assessment was conducted to assess whether or not MOS 11H (Heavy Anti-Armor Weapons Infantryman) possesses the necessary physical attributes and prerequisite skills and knowledge to operate the NLOS-CA gunner's station. The assessment was limited to the NLOS-CA gunner's station operation and was based on data extracted from the Target Audience Description (TAD) contained in the NLOS-CA System MANPRINT Management Plan (SMMP). MOS 96H (Aerial Intelligence Specialist) was used as the baseline MOS for comparability analysis. Armed Forces Qualification Test (AFQT) and Armed Services Vocational Aptitude Battery (ASVAB) scores, education level, and Physical capacity, Upper extremities, Lower extremities, Hearing, Eyes, Psychiatric (PULHES) classification were used as analysis criteria. The results of the analysis indicate that there is some risk in assuming that the 11H MOS is an appropriate MOS for the NLOS-CA gunner position. This risk is associated primarily with requirements for color vision and ASVAB requirements.

1.6 CONCLUSIONS. The overall Logistics Impact of Alternative 2 is marginally greater than that of Alternative 1. Given that the NLOS-CA and the LRSM in the light configuration both use the heavy HMMWV, and, if firing rates and usage rates are very similar, then similar logistics impacts can be anticipated. If a more detailed MP and operational concept for the LRSM becomes available, then the logistics impact should be reassessed.

# **NON-LINE OF SIGHT - COMBINED ARMS (NLOS-CA) MANPOWER, PERSONNEL AND LOGISTICS IMPACT ANALYSES (LIA)**

## **CHAPTER I**

**1.0 INTRODUCTION.** The United States Army Training and Doctrine Command (TRADOC) Analysis Center (TRAC), Fort Lee, Virginia, contracted with Advanced Engineering and Planning Corporation (AEPCO) and Dynamics Research Corporation (DRC) to perform a Manpower, Personnel (MP) and Logistics Impact Analyses (LIA) study on the Non-Line of Sight - Combined Arms (NLOS-CA) Weapon System (WS). Both contractors worked closely with the NLOS-CA Project Manager's Office (PMO), U.S. Army Missile Command (USAMICOM), Redstone Arsenal, Alabama, and received excellent support from the U.S. Army Ordnance Missile and Munitions Center and School (USAOMMCS), the U.S. Army Infantry School (USAIS), the U.S. Army Ordnance Center and School (USOC&S), the U.S. Army Transportation School (USATSCH), the U.S. Army Combined Arms Support Command (USACASCOM), and the Program Manager (PM) Mortars at the Army Research, Development and Engineering Center, Picatinny Arsenal. Analysis results and methodology are summarized in this report. Detailed analyses are documented in the appendices of this volume. Volume II, The Administrative Section, provides a chronology of the development of the LIA Analysis Plan and subsequent development of this report. Included in Volume II are data sheets and certifications provided by data sources.

**1.1 OVERVIEW.** This LIA and MP analyses was conducted in support of the anticipated March 1994 NLOS-CA Army System Acquisition Review Council (ASARC) Milestone (MS) II Decision Review (MDR). The MP analysis was conducted in conjunction with the LIA in support of the COEA and is documented in this report. The NLOS-CA MS II COEA Study Plan (SP) was certified on 10 June 1993 by TRAC Headquarters, Fort Leavenworth, Kansas. The COEA SP provides guidance on the Essential Elements of Analyses (EEA) needed to conduct this analysis. Appendix C and Appendix E to the COEA SP describe the requirements for the LIA and MP analysis requirements, respectively.

**1.2 NLOS-CA SYSTEM DESCRIPTION.** The NLOS-CA is a highly mobile, flexible addition to the U.S. Army's war-fighting capabilities designed to engage and defeat a wide variety of targets including armored combat vehicles, other high value ground targets, and hovering or moving rotary wing aircraft which may be masked from the line of sight. The WS shall operate in day/night and adverse weather (DNAW). NLOS-CA targets will be preplanned or engaged as targets of opportunity. The NLOS-CA Company will be an integral part of the maneuver brigade. NLOS-CA platoons may be attached to one maneuver battalion/task force or may be employed in

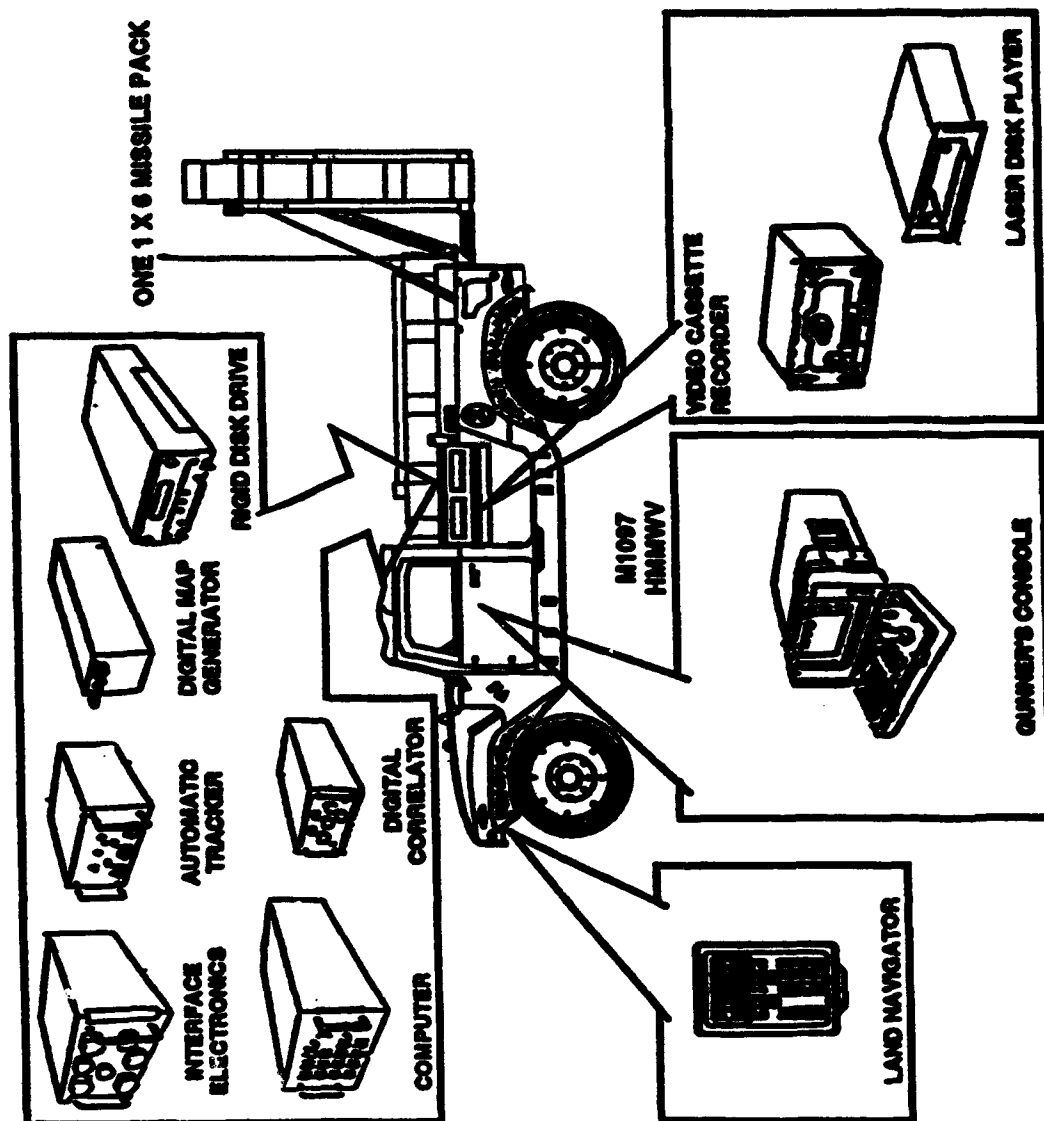
support of the brigade battle. Target acquisition and identification information for NLOS-CA will be provided by the Brigade Tactical Operations Center (TOC) through organic communications to the NLOS-CA Platoon for assignment to firing units. A two man crew consisting of gunner and driver will operate the system. Two variants of NLOS-CA are ultimately expected to be procured: a wheeled version mounted on the M1097 Heavy High Mobility Multipurpose Wheeled Vehicle (HMMWV), or HHV; and a tracked version which will utilize the Bradley Fighting Vehicle chassis as a prime mover. This analysis is limited to this HHV-mounted version. The NLOS-CA consists of a vehicle mounted fire unit (FU) armed with fiber optic guided missiles; a launcher; and a gunner's station for mission planning, fire control, and embedded training functions; Single Channel Ground and Airborne Radio System (SINCGARS) radios; and materiel handling equipment (MHE) for reloading missile assemblies (see Figure 1-1 System Sketch). The NLOS-CA's subsystem elements consist of the following:

**1.2.1 Missile.** The NLOS-CA missile (see Figure 1-2 Missile Sketch) will have the unique ability to transmit, via a fiber optic cable, real time seeker video images to the gunner's console (GC). Simultaneously, gunner initiated and system generated guidance commands can be transmitted up the fiber optic cable to the missile for implementation. Missiles will be stored, transported and loaded onto the launcher while encased in a launch/storage container (L/SC) with a six round capacity. The combination of a missile and the L/SC is defined as a missile assembly.

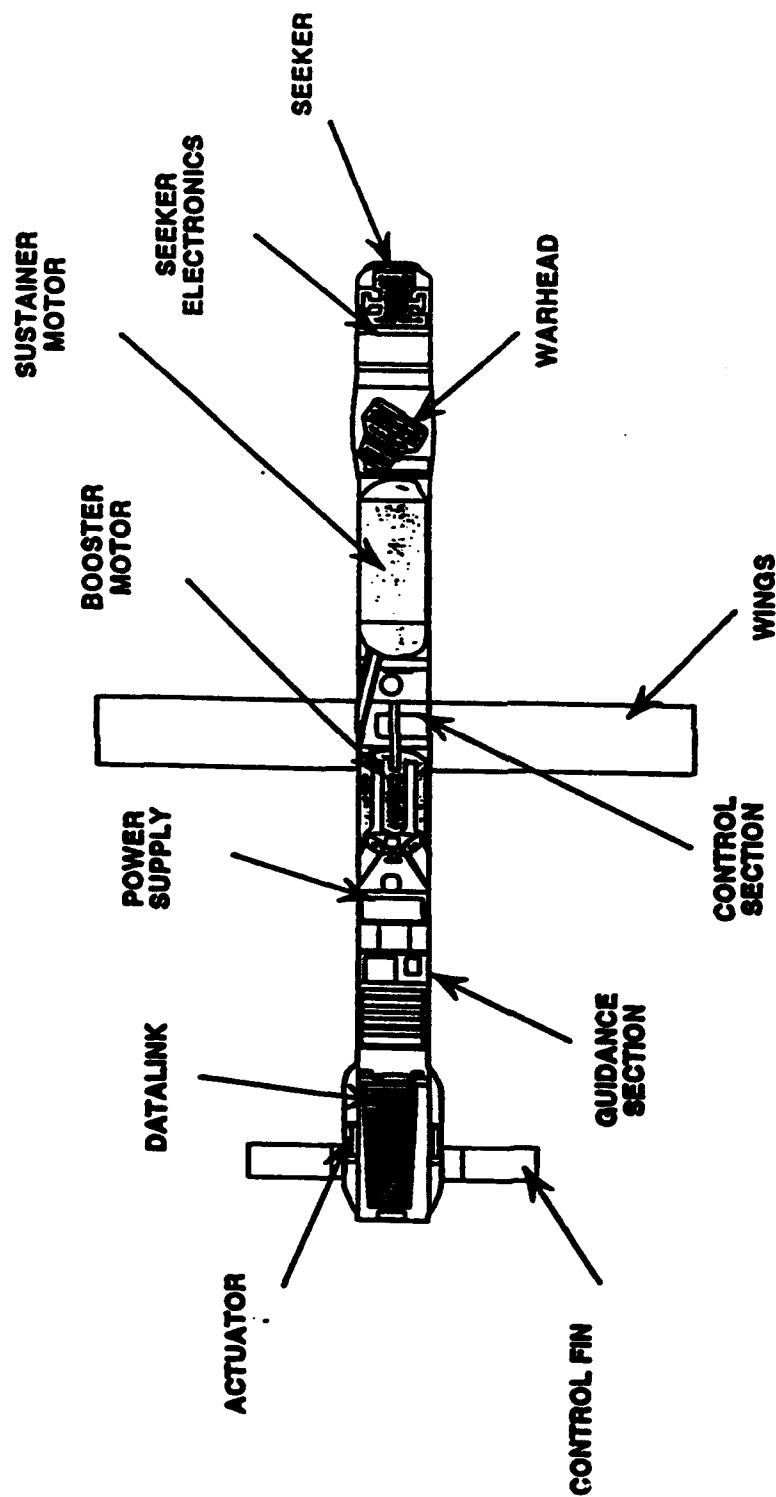
**1.2.2 Prime Mover.** The M1097 HHV will be the prime mover for the NLOS-CA FU which will be manned by a crew of two. The physical characteristics of the HHV will define the envelope for allowable weight and space of the NLOS-CA WS equipment including on vehicle equipment (OVE), the crew and their equipment.

**1.2.3 Gunner's Station.** The gunner's station is defined as the aggregation of all equipment and interfaces required to carry out the gunner's functions of land navigation, emplacement, mission planning, receipt and processing of target cues, missile launch and flight, target area search, lock-on, terminal homing, aimpoint readjustment, damage assessment, battlefield surveillance, and embedded training. The primary WS display and man/machine interface to components of the gunner's station is the GC.

**1.2.4 Launcher.** The launcher supports and contains the missile assemblies during the travel, reload and launch sequences. The launcher system shall be used to orient the missile assemblies prior to launch. Design of the launcher facilitates ease of missile assembly reload.



**FIGURE 1-1 NLOS-CA System Description**  
**Source: ILSP for NLOS-CA System, dated July 1993**



• MISSILE DRAWING NOT TO SCALE

**FIGURE 1-2 FOG-M System Description**  
**Source: ILSP for NLOS-CA System, dated July 1993**

**1.2.5 Logistics.** The NLOS-CA will be supportable by standard Army logistics systems in place at First Unit Equipped (FUE) and will use existing TOE tools, Test Measurement and Diagnostic Equipment (TMDE), and support equipment and personnel. The existing four level maintenance concept will be applied to GFE. The NLOS-CA FU will employ a three level maintenance concept: Unit, Direct Support (DS) and Depot. No organic maintenance capability will be available within the NLOS-CA company to provide unit level maintenance support. DS maintenance personnel will perform unit level maintenance workload for the system.

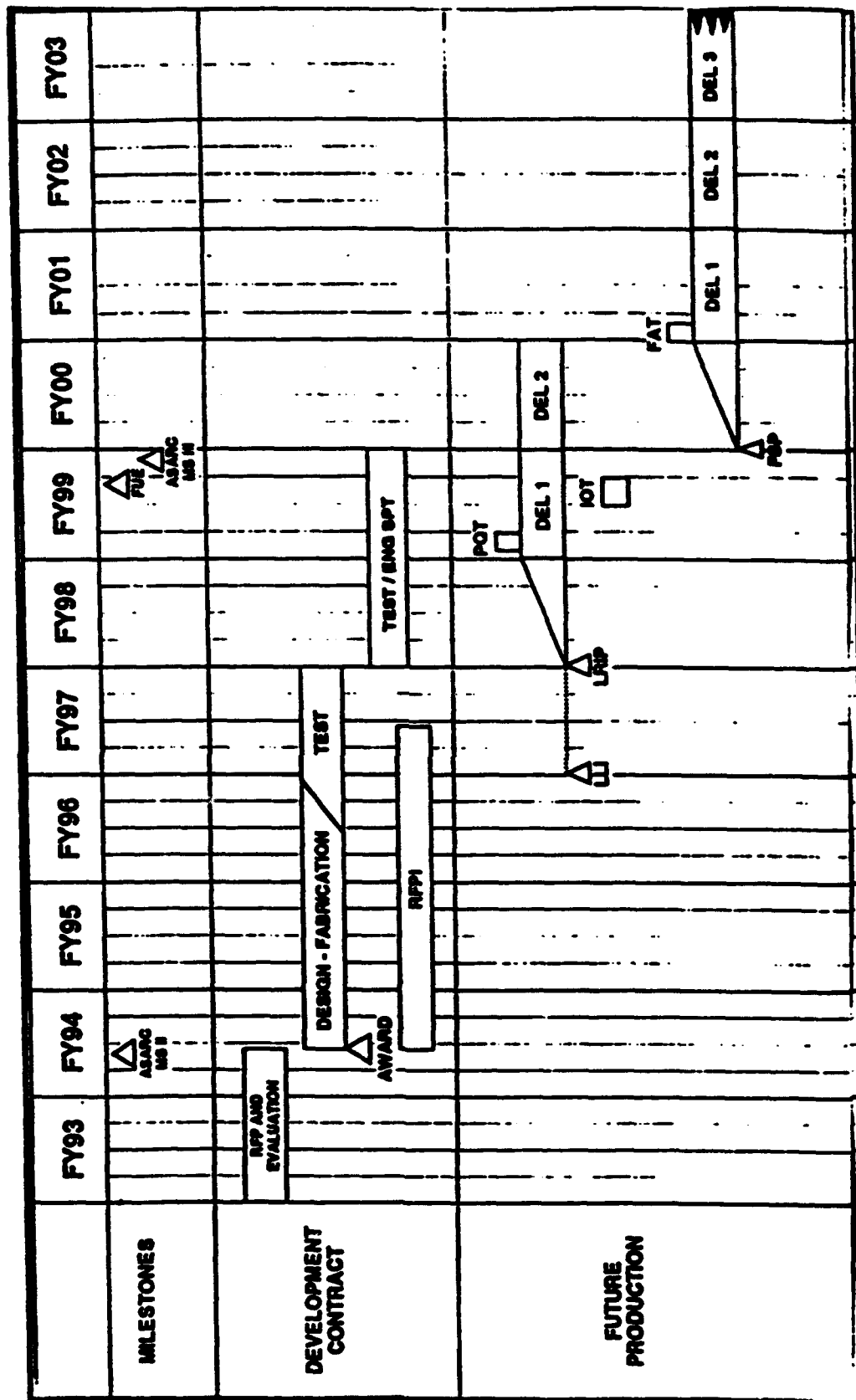
**1.3 NLOS-CA ACQUISITION SCHEDULE.** The NLOS-CA program was initiated in the late 1980's by the U.S. Army Missile Research and Development Center at Redstone Arsenal, Alabama. A full scale development (FSD) contract was awarded in 1988, but was terminated prior to completion of the Critical Design Review (CDR). Following termination of the FSD contract and review of the Program, alternate contracting approaches were developed and an accelerated acquisition strategy which maximizes the effectiveness of the government's previous development work was selected. That strategy, as of the date of preparation of this report is summarized as follows (see Figure 1-3 NLOS-CA Program Schedule). Due to uncertainties in the current budget process, changes in this schedule are under consideration.

- Initiation of Engineering and Manufacturing Development (EMD) for NLOS-CA is scheduled for the third quarter of Fiscal Year (FY) 94.
- A contract will be awarded for a 42-month effort to design, fabricate, conduct flight tests and manrate the system.
- A 24-month Test and Engineering Support option is available to complete test technical performance testing and further prove the readiness of the system for Low Rate Initial Production (LRIP).

**1.4 SCOPE AND STATEMENT OF WORK.** The scope of the MP and LIA are based on the NLOS-CA COEA SP as amended by guidance from the COEA study team and is delineated as follows:

**1.4.1 Issues Addressed in this Study.** Logistics and MP impacts were analyzed for a brigade level organization. Light and heavy brigades were addressed. A high level assessment of skills and knowledge prerequisites for institutional training of system operators and maintainers was completed as part of this study.

**1.4.2 Alternatives Addressed in this Study.** Two alternatives were assessed: (1) The NLOS-CA objective system; and (2) a Long Range Smart Mortar (LRSM) system. Both alternatives are described in detail in paragraph 1.5.



**FIGURE 1-3 NLOS-CA Program Schedule**  
**Source: ILSP NLOS-CA System, dated July 1993**

1.4.3 **Issues Not Addressed in this Study.** Cost and training impacts were not assessed as part of the MP and LIA studies.

1.5. **COEA STUDY PLAN ALTERNATIVES.** In accordance with the NLOS-CA COEA SP and guidance provided by the COEA study team, two alternative configurations (see Table 1-1) were assessed to determine their impact on MP and logistics support structures in place.

1.5.1 **Base Case.** There is no formal base case alternative for this study. NLOS-CA and the LRSM will be fielded as additions to the current force structure and will not replace any existing systems.

1.5.2 **Alternative Number 1.** The NLOS-CA alternative consists of the 1999 programmed force structure and equipment augmented by NLOS-CA. The system configuration and force structure is described as follows:

1.5.2.1 **System Configuration.** The current NLOS-CA design is based on the Fiber-Optic Guided Missile (FOG-M). Both heavy and light versions will be mounted on heavy HMMWVs. The NLOS-CA will be fielded as a separate company within the Brigade.

1.5.2.2 **Force Structure.** The study addresses logistics impacts on a heavy brigade with two armor battalions and two mechanized infantry battalions; and a light infantry brigade with three light infantry battalions. Total army impact was not addressed by the LIA. NLOS-CA force structure was based on TOE 07348T100, NLOS-CA Company (HVY); and TOE 07348T200 NLOS-CA Company (INF). Both organizations are assigned 12 NLOS-CA systems.

1.5.3 **Alternative Number 2.** Alternative Number 2 consists of the 1999 programmed force structure and equipment augmented by the LRSM.

1.5.3.1 **System Configuration.** The LRSM WS consists of a 120 millimeter (mm) mortar armed with "smart" munitions. The Heavy Version will be identical to the 120mm heavy mortar mounted in the M1064 model of the M113A chassis. The 120mm mortar is now fielded as the Battalion Mortar System (BMS). The light version will be mounted on a heavy HMMWV chassis for transport. The crew will dismount, emplace, displace and restow the weapon by hand. Munitions will be the Advanced Precision Guided Mortar Munitions (APGMM) with millimeter wave seeker guidance. For this study, the LRSM will be substituted for the NLOS-CA in the NLOS-CA company.

1.5.3.2 **Force Structure.** The LRSM will replace NLOS-CA, one-for-one in this study. NLOS-CA TOEs were used. The HMMWV transported, light version of the LRSM will be exchanged directly into the light NLOS-CA TOE. The Heavy Version, mounted in the M1064 will be inserted in the Heavy, track mounted, NLOS-CA TOE. Twelve (12) LRSMs are assigned to each NLOS/LRSM company.

|                                    | <b>BASE<br/>CASE</b>     | <b>ALT<br/>1</b>  | <b>ALT<br/>2</b>   |
|------------------------------------|--------------------------|---|--|
| <b>HEAVY BDE<br/>SRC 87042L231</b> | <b>CURRENT<br/>FORCE</b> | HMMWV-MTD<br>FOG-M<br>NLOS-CA COMPANY<br>-<br>TOE 07348T200 | M1064 MTD<br>120mm LRSM<br>NLOS-CA COMPANY<br>-<br>TOE 07348T100 |
| <b>LIGHT BDE<br/>SRC 77042L000</b> | <b>CURRENT<br/>FORCE</b> | HMMWV-MTD<br>FOG-M<br>NLOS-CA COMPANY<br>-<br>TOE 07348T200 | HMMWV*<br>120mm LRSM<br>NLOS-CA COMPANY<br>-<br>TOE 07348T200    |

\* HMMWV mounted for transportation only.

**TABLE 1-1 NLOS-CA LIA Alternatives**

**1.6 TECHNICAL APPROACH, METHODOLOGY AND TOOLS.** A "tailored" analytical approach, using only those analytical steps that were necessary to determine accurate MP and logistics impacts was employed.

**1.6.1 Technical Approach.** The technical approach used to determine NLOS-CA MP and logistics impacts consisted of the following steps (see Figure 1-4):

- Review Documentation. MP and logistics data and documentation was reviewed. Documents included specifications, acquisition support documents and supportability studies for both systems, GFE and surrogates. (see Appendix B in Volume I for a complete list of publications and reference materials researched).
- Determine data requirements;
- Collect Data. Selected subject matter experts (SMEs) and targeted data sources were interviewed and data requests were submitted. AEPCO/DRC analysts also attended several COEA SP meetings (see Volume II). Meetings were used to collect data, discuss various aspects of the NLOS-CA program, and obtain detailed guidance for MP and LIA execution.
- Conduct Analysis. MP and LIA impacts for the two alternatives were determined.
- Document Results.

**1.6.2 Methodology.** The methodology that was used in the conduct of this LIA was as follows:

- Essential Element of Analysis (EEA) #4 in the COEA SP addresses the training, logistics, manpower and personnel impacts of fielding the NLOS-CA. Training assessments are being conducted in a separate study.
- This general requirement was translated into six EEAs for the LIA through a review of Integrated Logistics Support (ILS) elements relevant to the respective systems.
- Measures of Performance (MOP) and Measures of Effectiveness (MOE) were identified for each EEA and each sub-analysis.
- Data requirements were identified and requests prepared.
- PM data sets were the primary sources of study data. PMO NLOS-CA coordinated data for that system and PM Mortar coordinated data requirements for the LRSM.

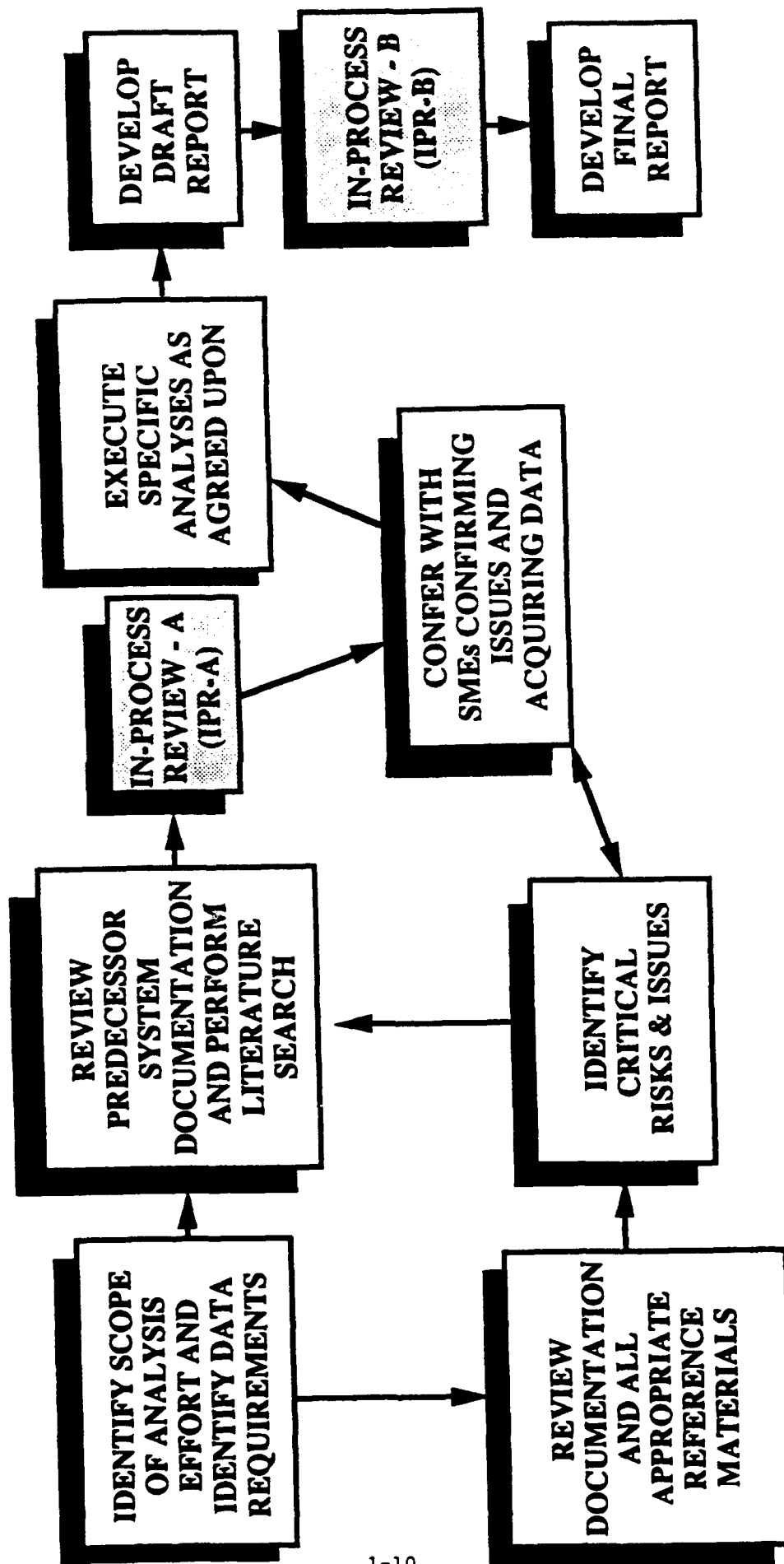


FIGURE 1-4 NLOS-CA LIA/MPA Technical Approach

- The results of sub-analyses have been consolidated and an overall assessment of logistics supportability has been conducted using EEA criteria.
- The analysis and results documented in this LIA report will be incorporated in the NLOS-CA COEA.

**1.7 ASSUMPTIONS AND CONSTRAINTS.** Assumptions and constraints documented in the COEA study plan apply to the LIA and MP analysis.

**1.7.1 Study Rules**

A. The base case for this study is the current force. Logistics requirements for the base case are considered to be zero. Both Study Alternatives are net additions to the force structure.

B. Analysis is based on the worst case scenario (heaviest logistics burden). This scenario is the 96 hour combat scenario defined in the NLOS-CA Operational Mode Summary/Mission Profile (OMS/MP).

C. The NLOS-CA OMS/MP applies to the LRSM.

D. Issues associated with employment and command and control (C<sup>2</sup>) of the LRSM are not addressed within the LIA.

**1.7.2 Constraints**

A. The LRSM has not been formally defined. Analysis is based on guidance provided by USAIS, PM Mortar and TRAC through the COEA study team. This guidance is documented throughout the study.

B. Because LRSM is a notional system, mature data was unavailable in many cases. The best available data was used with the approval of responsible agencies.

**1.8 ESSENTIAL ELEMENTS OF ANALYSIS.** TRAC-LEE at Fort Lee, Virginia directed that the analyses be focused on the following:

**1.8.1 Logistics Impact Analysis EEAs.**

**1.8.1.1 LIA EEA 1.** What are the supply differences between the alternatives.

**1.8.1.2 LIA EEA 2.** What are the maintenance differences between the alternatives.

**1.8.1.3 LIA EEA 3.** What are the transportation differences between the alternatives.

1.8.1.4 LIA EEA 4. What are the Combat Service Support (CSS) Force Structure differences between the alternatives.

1.8.1.5 LIA EEA 5. What are the differences in Reliability, Availability and Maintainability (RAM) between the alternatives.

1.8.1.6 LIA EEA 6. What are the differences in transportability and deployability between the alternatives.

1.8.2 Manpower and Personnel EEAs.

1.8.2.1 MP EEA 1. Determine MP Force Structure requirements for the NLOS-CA COEA in support of the MDR II.

1.8.2.2 MP EEA 2. Determine the personnel requirements by Military Occupational Specialty (MOS) and grade for the NLOS-CA and the LRSM alternatives.

1.9 MEASURES OF PERFORMANCE (MOP)/MEASURES OF EFFECTIVENESS (MOE). Twenty-seven (27) MOPs and MOEs were used to assess logistics impacts of NLOS alternatives. They are listed below by sub-analysis.

1.9.1 Supply

Class III and V Supplies. Gross requirements for fuel (gallons), and ammunition (short tons) per brigade per day.

- Class III Gallons
- Class III Tons
- Class V Cubic Feet
- Class V Tons

1.9.2 Packaging, Handling, and Storage (PHS). Resources and procedures used to ensure that PHS ammunition needs were met included the following:

- Round Size
- Pallet Size
- Brigade Stowed Rounds
- MHE Requirements
- Storage Requirements

**1.9.3 Maintenance.** Resources, procedures and equipment required for system maintenance of the alternatives included the following:

- TMDE Type and Quantity
- BIT/BITE
- Maintenance Concept

**1.9.4 Reliability, Availability and Maintainability (RAM).** RAM sub-analyses have included the following:

- Direct Productive Annual Maintenance Man Hours (DPAMMH)
- Mean Time Between Operational Mission Failure (MTBOMF)
- Mean Time Between Unit Maintenance Actions (MTBUMA)
- Mean Time to Repair (MTTR)
- Maintenance Ratio (MR)
- Operational Availability ( $A_o$ )

**1.9.5 Transportation.** Trucks required to move supply requirements calculated in the supply sub-analysis included the following:

- Class III trucks per day
- Class V trucks per day

**1.9.6 Transportability/Deployability.** Assessment of the limitations by transportation mode and deployability requirements of the alternatives included the following:

- Shipping Requirements
- Transportation Mode Constraints
- Aircraft Sorties
- Days to Prepare

**1.9.7 Recoverability.** Resources, procedures and equipment required to recover unserviceable weapons systems from field locations.

- Recoverability.

1.9.8 Explosive Ordnance Disposal (EOD) Requirements. Resources, procedures and equipment required to support EOD requirements of the WS.

- EOD

1.9.9 Standardization and Interoperability. Extent of hardware commonality with exiting inventories and the ability of the system to provide and accept services from other systems and forces.

- Standardization and Interoperability.

1.10 RELATIONSHIP OF EEA, SUB-ANALYSES, MOP AND MOE. The relationship between EEA, sub-analyses and MOP/MOE is the basis for the application of the AHP. The relationship between MOP/MOE and sub-analyses is described in paragraph 1.9 above. The relationships between sub-analyses and EEA is displayed in Figure 1-5. Although EOD, Recoverability, and Standardization and Interoperability are not assigned EEAs, they are nonetheless critical to logistics supportability, and have been incorporated in this study as sub-analyses.

# Sub-analysis

| EEA   | Supply | PHS | Maintenance | RAM | Transportation | Transportability/<br>Deployability | Recoverability | EOD | Standardization &<br>Interoperability | MANPOWER | PERSONNEL |
|---|--------|-----|-------------|-----|----------------|------------------------------------|----------------|-----|---------------------------------------|----------|-----------|
| Supply Differences                              | X      |     |             |     |                |                                    |                |     |                                       |          |           |
| Maintenance Differences                         |        |     | X           |     |                |                                    |                |     | X                                     | X        |           |
| Transportation Differences                      |        | X   |             |     | X              |                                    |                |     |                                       |          |           |
| CSS Force Structure Differences                 |        | X   | X           | X   | X              |                                    | X              | X   | X                                     | X        | X         |
| Reliability Differences                         |        |     |             | X   |                |                                    |                |     |                                       | X        |           |
| Operational Availability Differences            |        |     |             | X   |                |                                    |                |     |                                       |          |           |
| Maintainability Differences                     |        |     |             | X   |                |                                    |                |     |                                       | X        |           |
| Transportability & Deployability<br>Differences |        |     |             |     |                | X                                  |                |     |                                       |          |           |
| Manpower/Personnel                              |        |     |             |     |                |                                    |                |     |                                       | X        | X         |

FIGURE 1-5 Sub-Analysis to EEA Relationships

# **NON-LINE OF SIGHT - COMBINED ARMS (NLOS-CA) MANPOWER, PERSONNEL AND LOGISTICS IMPACT ANALYSES (LIA)**

## **CHAPTER 2**

**2.0 LOGISTICS IMPACT ANALYSES.** The Logistics Impact Analysis (LIA) determines and assesses the logistics impact of fielding the NLOS-CA weapon system (WS). It provides independent results and inputs to the COEA and MILESTONE II decision process. It also provides input to cost and other COEA sub-analyses.

**2.1 GENERAL.** The final version of the LIA Annex to the COEA will be provided by TRAC-LEE.

**2.1.1 Objective and Scope.** The objective of this LIA is to determine the logistics impact on the Combat Service Support (CSS) system of fielding either alternative of the NLOS-CA WS. This study analyzed the impact of NLOS-CA at the maneuver brigade level for two alternative configurations.

### **2.1.2 LIA Assumptions and Constraints**

#### **2.1.2.1 Assumptions**

- All LIA analyses are consistent with the requirements of the COEA.
- The Base Case for this study is the current force structure. NLOS-CA and LRSM will be net additions to Brigade resources.
- Impacts were assessed for the worst case (heaviest logistics burden) scenario. The 96 hour combat scenario found in the NLOS-CA, OMS-MP describes this scenario.
- The study addressed objective configurations of alternatives. Interim configurations or fielding concepts will not be addressed.

#### **2.1.2.2 Constraints**

- The LRSM concept has not been formally defined. Analysis has been based on guidance provided by the USAIS, PM Mortar and TRAC through the COEA study team.
- Because LRSM is a notional system, mature data was not available in many cases. The best available data was used with approval of the cognizant agencies.

- The stringent time frame allotted for completion of this study limited the analysts ability to collect and edit data. Where certified data was not available, standard references were used.

**2.2 ANALYSIS AND RESULTS.** The following paragraphs summarize the analysis conducted to determine the logistics impact of Alternatives 1 and 2 as measured by Measure of Performance (MOP) or Measure of Effectiveness (MOE). These analyses are organized by sub-analysis. In some cases, more detailed analysis was conducted to develop underlying assumptions to the analyses summarized in this section. These detailed analyses are presented in the Appendices to this report.

**2.2.1 Supply.** The purpose of this sub-analysis was to determine the impact on supportability of gross quantities of fuel and ammunition required by the NLOS-CA and LRSM WSS. Short tons, cubic feet and gallons per day per NLOS-CA company were calculated for both alternatives. These values form the basis for determining truckload and vehicle support requirements. They also represent an indirect logistics impact on the supply system independent of transportation requirements. Supplies require handling and storage throughout the pipeline. Although these requirements may not be enough to generate additional manpower, equipment or facility requirements, the marginal increase in workload and the turbulence created in the system by additional volumes of material ultimately decreases the effectiveness and productivity of both individuals and organizations.

**2.2.1.1 Class III - Fuel.** Fuel requirements were determined for each WS by multiplying usage times fuel consumption rates. Fuel consumption per day per WS was totaled to determine unit requirements. The methodology is summarized below. Detailed calculations are presented in Appendix D, Fuel Consumption Analysis to this report. The methodology used to calculate fuel consumption is summarized as follows:

- Determine system usage. The first step in determining fuel consumption is the calculation of system usage. Vehicle operating miles are the basis for determining fuel consumption for wheeled vehicles. Operating hours are the basis for determining fuel consumption for stationary equipment such as generators.

Operating hours and miles for combat vehicles were calculated from the NLOS-CA Operational Mode Summary/Mission Profile (OMS/MP). The NLOS-CA OMS/MP was applied to the LRSM as well, based on guidance from the USAIS, PM Mortar and the COEA study team. Calculations and analysis employed to derive system usage values are detailed in Appendix C, Mission Profile Analysis, to this report.

- Determine fuel consumption rates. Complete fuel consumption rates for equipment used in this study were not available from the US Army Petroleum Center. Rates were obtained from FM 10-13, Supply and Service Reference Data.
- Calculate Total Fuel consumption. Total consumption is calculated by multiplying consumption rates by vehicle usage and summing by equipment quantities in each unit.

Results of the Class III Analysis are summarized below in Table 2-1 (see Figure 2-1 Fuel Consumption Comparison):

TABLE 2-1

FUEL CONSUMPTION SUMMARY  
GAL PER BRIGADE PER DAY

|                 | L I G H T |        | H E A V Y |         |
|-----------------|-----------|--------|-----------|---------|
|                 | NLOS      | LRSB   | NLOS      | LRSB    |
| GALLONS PER DAY | 245.75    | 245.75 | 485.18    | 851.72  |
| TONS PER DAY    | 1738.9    | 1738.9 | 3241.00   | 6026.77 |

2.2.1.2 Class V - Ammunition. Daily ammunition consumption was calculated by Brigade for both NLOS-CA and LRSB systems using the following methodology. Detailed analysis is documented in Appendix E (Ammunition Consumption Analysis) to this report.

- Calculate daily ammunition consumption per WS for the NLOS-CA from the NLOS-CA OMS/MP (see Appendix C).
- Convert NLOS-CA consumption rates to LRSB consumption. Based on guidance from the USAIS and PM Mortar, the individual precision guided mortar munition is one half as effective as the FOG-M. Multiply NLOS-CA ammunition consumption by two to obtain the equivalent killing capacity for the LRSB.
- Calculate Brigade consumption. Ammunition daily consumption was multiplied by 12 WSs per brigade to determine Brigade consumption. Requirements for fractional pallets were rounded up to the next whole pallet and weight and volume were calculated based on whole pallet quantities.

# FUEL CONSUMPTION GAL PER DAY PER BDE DIESEL

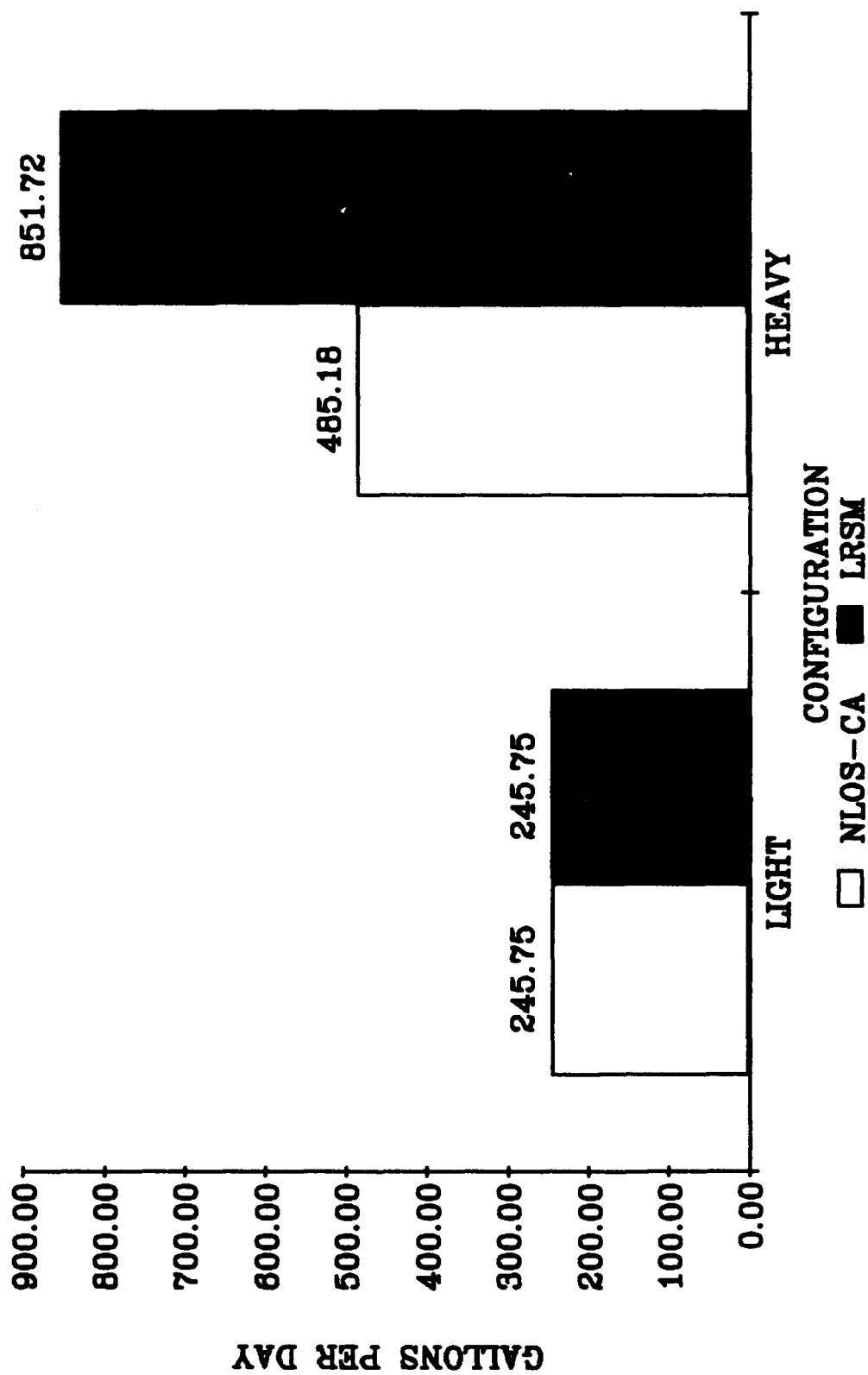


FIGURE 2-1 Fuel Consumption Summary

Results of this analysis are summarized as follows in Table 2-2 (see Figures 2-2 and 2-3 for ammunition consumption graphs):

**TABLE 2-2**  
**AMMUNITION CONSUMPTION**  
**PER BRIGADE PER DAY**  
**COMBAT SCENARIO**

|         | LIGHT NLOS | LIGHT LRSM | HEAVY NLOS | HEAVY LRSM |
|---------|------------|------------|------------|------------|
| ROUNDS  | 75         | 150        | 177        | 354        |
| PALLETS | 13         | 17         | 30         | 40         |
| STONS   | 7.1        | 4.1        | 16.4       | 9.7        |
| CUFT    | 531.7      | 758.2      | 1227.0     | 1784.0     |

Daily Class V tonnage consumed by the NLOS system is 35% to 40% greater than Class V tonnage consumed by the LRSM. However, the ammunition volume of the LRSM is 76% to 80% greater for the LRSM versus the NLOS. Because shipping volume is more critical to shipping capacity than tonnage, the logistics impact of LRSM ammunition consumption is greater than the impact of the NLOS.

**2.2.2 Packaging, Handling and Storage (PHS).** The PHS sub-analysis assessed the logistics impacts of process, procedures, equipment and supplies required to prepare and protect ammunition during shipment. Five MOPs were analyzed within the PHS sub-analysis:

- Individual Round Size
- Pallet Configuration
- Brigade Stowed Rounds
- Material Handling Equipment (MHE) Requirements
- Storage Requirements

**2.2.2.1 Individual Round Size.** The dimensions of the individual round affect the handling of the ammunition throughout the supply pipeline. They also affect the crew's ability to handle the ammunition in the anticipated field environment.

# AMMUNITION CONSUMPTION PER DAY PER LIGHT BDE

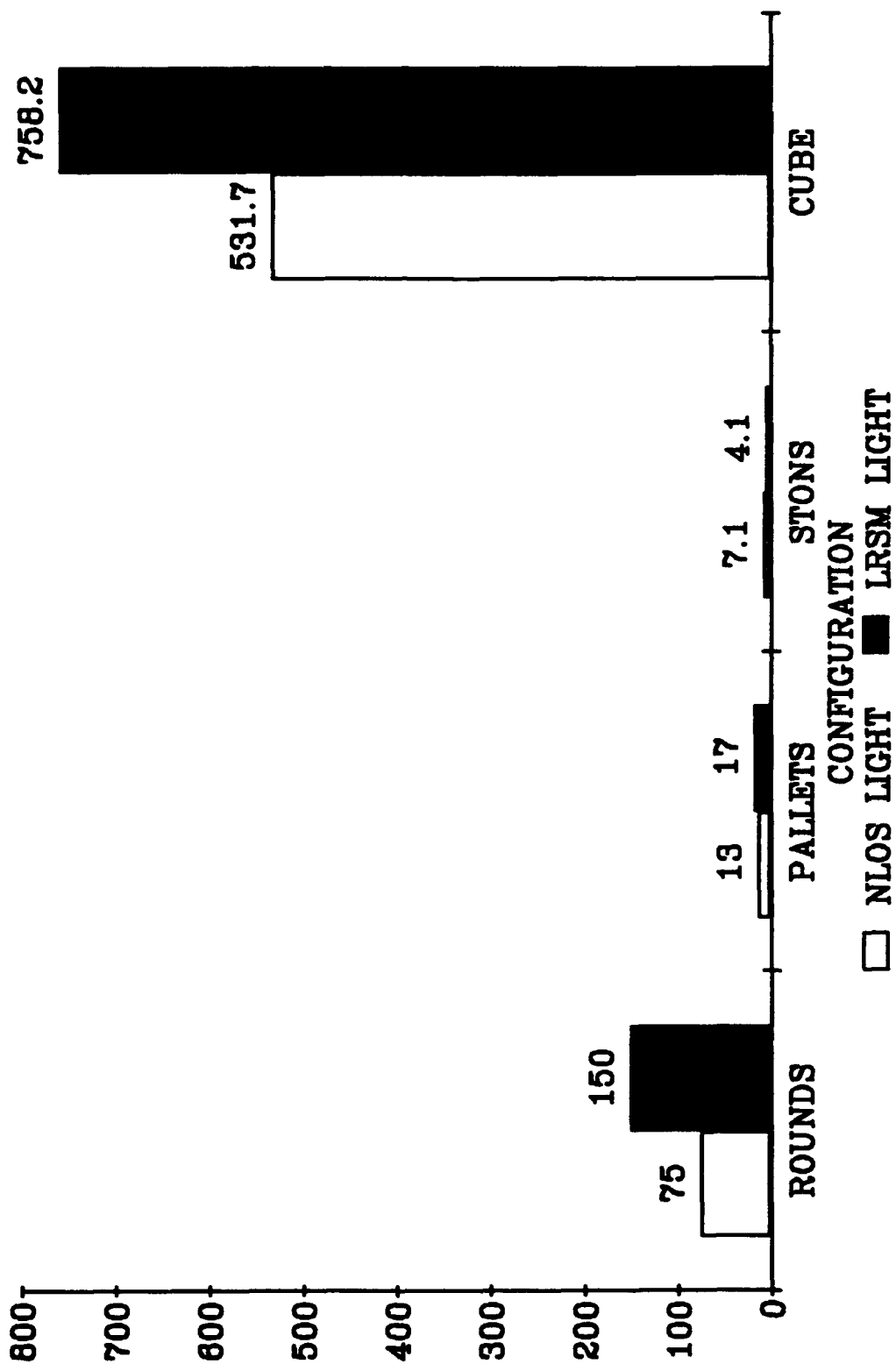


FIGURE 2-2 Ammunition Consumption Summary - Light Brigade

# AMMUNITION CONSUMPTION PER DAY PER HEAVY BDE

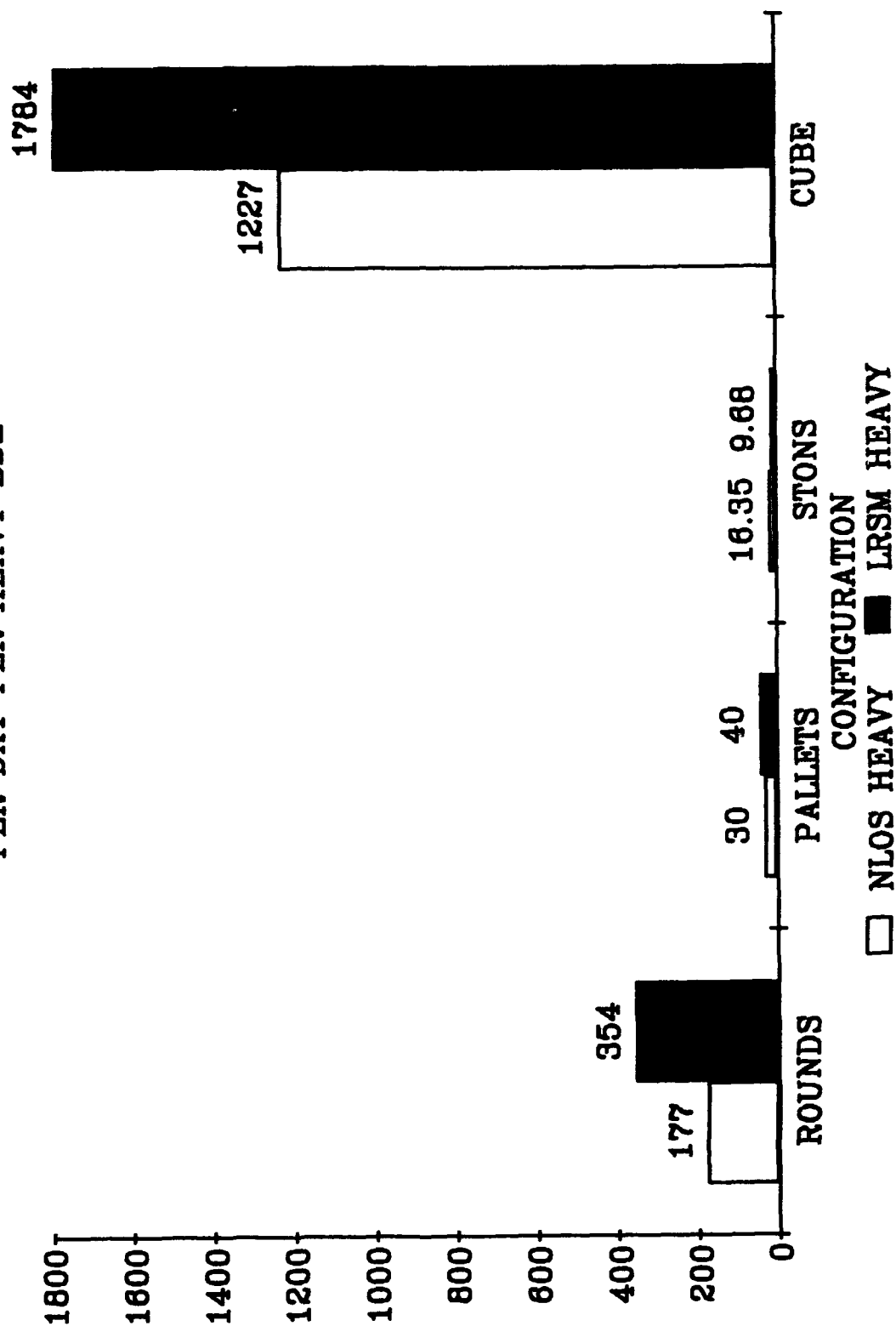


FIGURE 2-3 Ammunition Consumption Summary - Heavy Brigade

The dimensions of individual rounds are summarized below in Table 2-3 (see Figure 2-4 for individual round dimensions graphs).

**TABLE 2-3**  
**INDIVIDUAL ROUND DIMENSIONS**  
**NLOS-CA and LRSM**

|                     | NLOS  | LRSM |
|---------------------|-------|------|
| LENGTH (IN)         | 66    | 39   |
| DIAMETER (IN)       | 6     | 4.72 |
| CUFT                | .36   | .17  |
| WEIGHT (LB)         | 82    | 40   |
| EXPLOSIVE WT (LB)   | 10.94 | 5    |
| TOT WT/EXPL WT (LB) | 7.52  | 8    |
| CUFT/EXPL WT (LB)   | .033  | .034 |

The LRSM round has not been defined. The dimensions of the STRIX round were used in this study in accordance with guidance provided by PM Mortar and the COEA Study Team. The NLOS-CA missile is larger than the LRSM smart mortar round in all dimensions, including explosive weight. There is a significant functional difference between the NLOS-CA missile and the LRSM smart mortar round. For that reason, direct comparison between the two rounds is difficult. To facilitate this comparison, ratios of total weight and volume to explosive weight have been used. These measure the size of the round relative to the killing power in the round. On this basis, both the NLOS-CA and LRSM rounds are similar. In summary, the logistics impact of the NLOS-CA round are greater than the logistics impact of the LRSM.

**2.2.2.2 Pallet Configuration.** Ammunition is managed and handled in pallet loads down to the field ammunition supply point. The dimensions and characteristics of the loaded pallet, therefore, have a significant impact on the logistics supportability of a WS. A comparison of ammunition pallet dimensions for the NLOS-CA and the LRSM are summarized below in Table 2-4 (see Figure 2-5 for ammunition pallet comparison graph).

# INDIVIDUAL ROUND DIMENSIONS

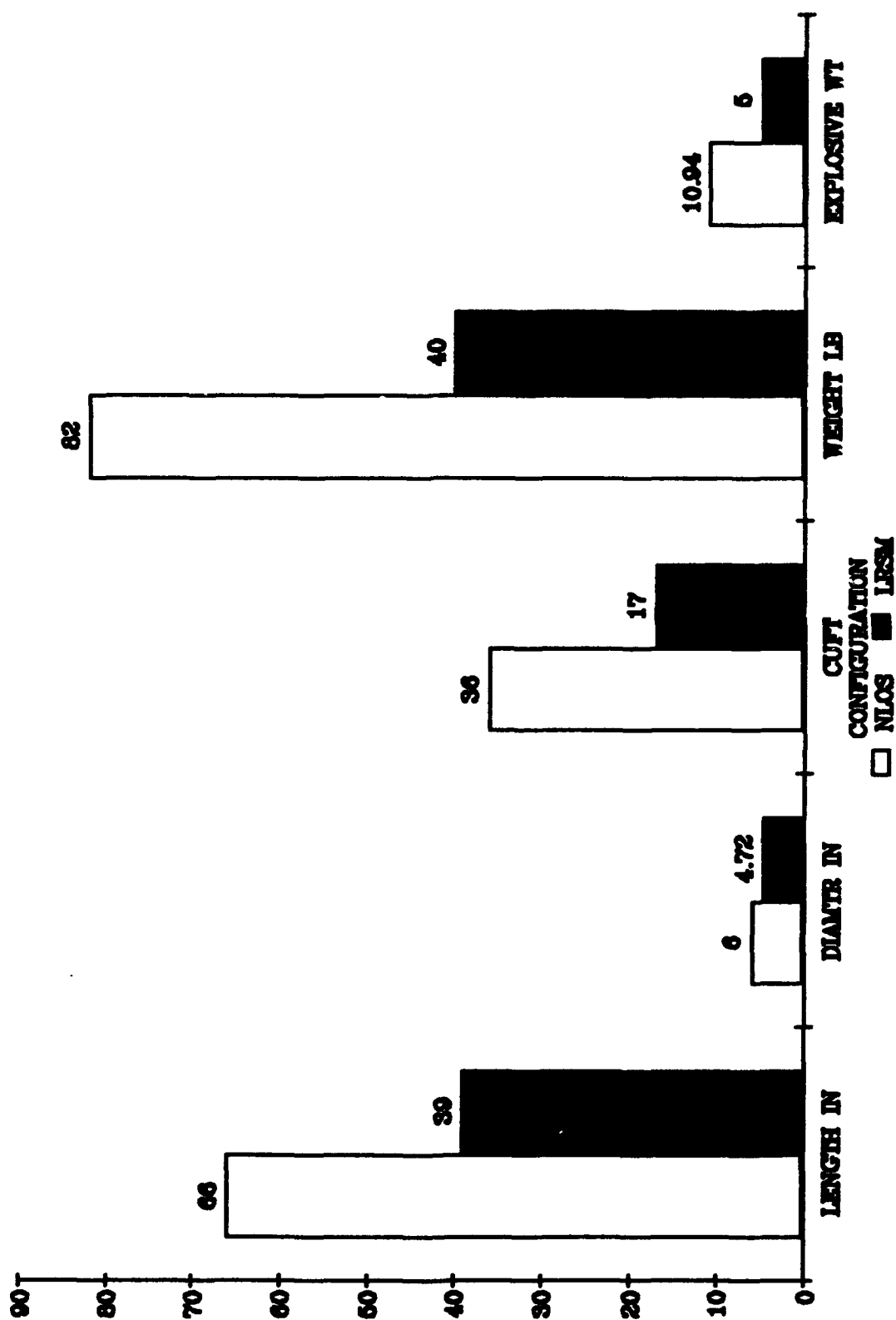


FIGURE 2-4 Individual Round Summary

TABLE 2-4

PHS  
AMMO PALLET COMPARISON

|                        | NLOS   | LRSM |
|------------------------|--------|------|
| ROUNDS                 | 6      | 9    |
| LENGTH (IN)            | 86     | 43   |
| WIDTH (IN)             | 64.5   | 39   |
| HEIGHT (IN)            | 12.75  | 46   |
| CUFT                   | 40.9   | 44.6 |
|                        |        |      |
| TOT WEIGHT (LBS)       | 1088.2 | 484  |
| EXPLOSIVE WEIGHT (LBS) | 65.64  | 45   |

The NLOS-CA missile is transported and fired in a six round pack. Each missile pack constitutes a pallet load. The LRSM round has not been defined. The pallet configuration used for the STRIX mortar round has been used for this study in accordance with guidance by PM Mortar and the COEA Study Team. Pallet dimensions reflect the dimensions of the individual rounds. The total volume of the respective pallets is similar, however, the NLOS pallet consists of a single, long, thin package. The LRSM pallet is relatively square and much higher. The square shape of the LRSM pallet may support more efficient loading of multiple pallets. The total weight of the NLOS pallet is 225% greater than the LRSM pallet, which further limits flexibility in bulk loading confirmation. Cube and total weight to explosive weight ratios show the NLOS-CA pallet to be more efficient in terms of volume, but less efficient in terms of weight. In summary, the logistics impact of the NLOS-CA pallet is greater than the impact of the LRSM pallet.

**2.2.2.3 Brigade Stowed Rounds.** Rounds stowed or carried on WSs are a fixed component of each unit's basic load of ammunition. Stowed rounds must be handled by unit personnel and requirements must be supported by the supply system. Stowed round quantities were defined as 144 (12 rounds per each of 12 firing units) for the NLOS-CA. Notional LRSM WSs were defined as carrying 39 and 64 rounds per WS for light and heavy configurations, respectively. Twelve WSs were allocated to each Brigade. Total volume and total weight for the NLOS-CA was calculated based on a SIX missile package as the basic handling unit. Volume and weight for

# AMMUNITION PALLET DIMENSIONS

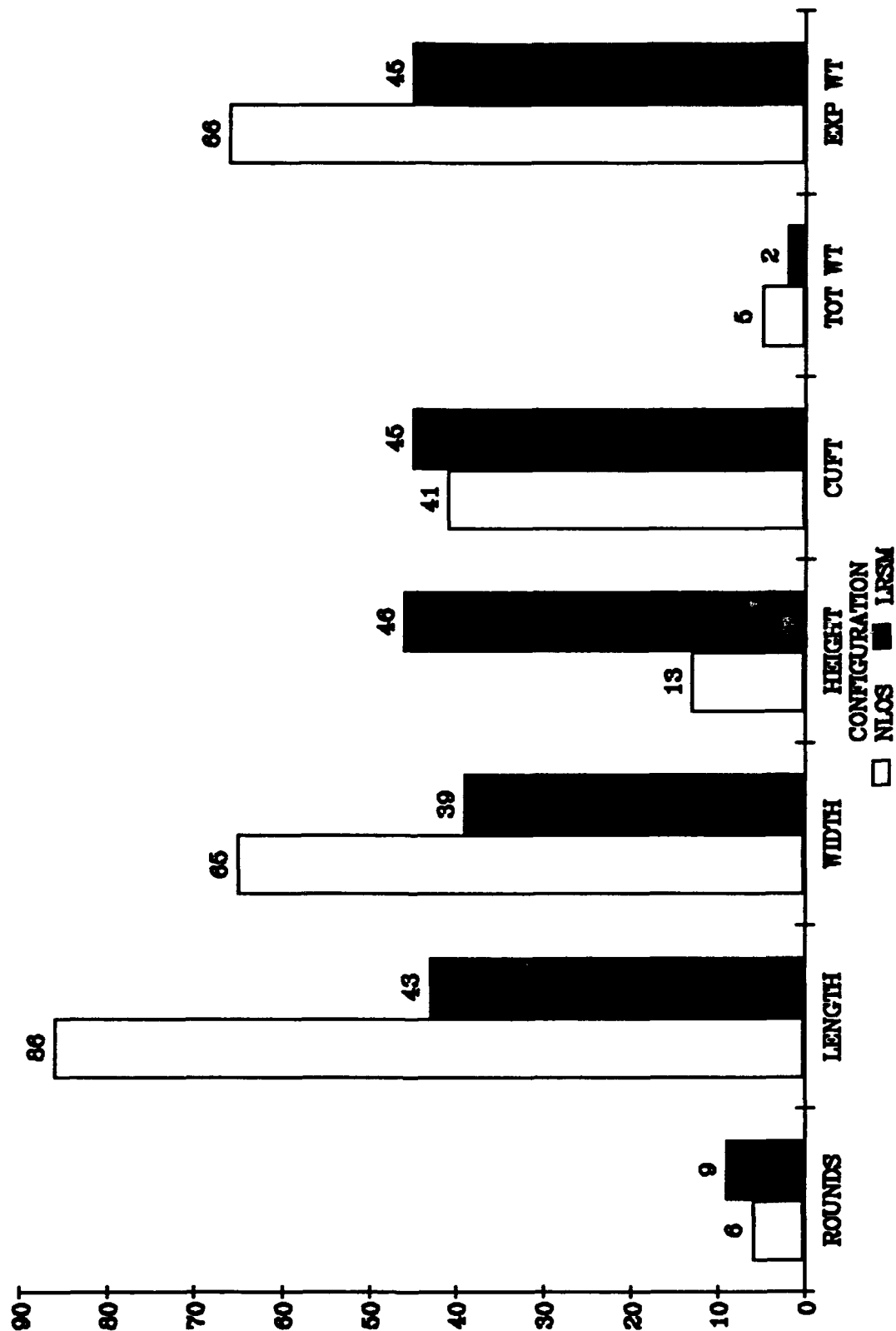


FIGURE 2-5 Pallet Comparison Summary

the LRSM rounds was calculated based on individual round containers. The PHS impacts for the Brigade level stowed round quantities are summarized below in Table 2-5 (see Figures 2-6, 2-7 and 2-8 for Brigade Stowed Load Comparison graphs):

**TABLE 2-5**

**BRIGADE STOWED LOAD COMPARISON**

|                    | NLOS (Heavy & Light) | LIGHT LRSM | HEAVY LRSM |
|--------------------|----------------------|------------|------------|
| STOWED ROUNDS      | 144                  | 468        | 768        |
| CUFT               | 981.6                | 1675.44    | 2749.44    |
| TOTAL WEIGHT (LBS) | 26160                | 18720      | 30720      |

Volume increases directly with the number of rounds, while total weight is less for the light version of the LRSM versus the NLOS-CA WS. Although the unified container used for the NLOS missile creates some handling problems and drives requirements for MHE at the unit level, the LRSM has a greater logistics impact at Brigade level and below where bulk shipments must be broken down and rounds handled individually for on-board stowage. The logistics impact of the LRSM Brigade stowed round load is greater than the impact of the NLOS. Volume and weight for the stowed round quantities of the LRSM are greater than for the NLOS-CA for both light and heavy configurations reflecting higher stowed round requirements. The logistics impact of brigade stowed round loads for the LRSM is greater than the impact of NLOS stowed round load.

**2.2.2.4 Material Handling Equipment (MHE) Requirements.** The size, weight and volume of ammunition supplies require MHE at all levels above Brigade. Requirements for new or additional equipment can have a significant impact on units in terms of sustainment and mobility. Although somewhat larger, the LRSM is assumed to be similar to 120mm mortar rounds in the field or planned for issue. Standard procedures and MHE will be used at wholesale, bulk storage and handling points. Onboard storage is loaded by hand, one round at a time. NLOS-CA rounds are managed throughout the supply system on a six round, pallet-sized missile pack. This pack is assumed to be a standard pallet size and can be handled by issue MHE at bulk supply points. It cannot, however, be man-handled by the two man-crew. A hydraulic crane is required on the WS and in the field to pick-up and deliver missile packs as described by the current support concept. The logistics impact of the NLOS-CA system on MHE requirements is strongly greater than the impact of the LRSM.

# STOWED ROUNDS

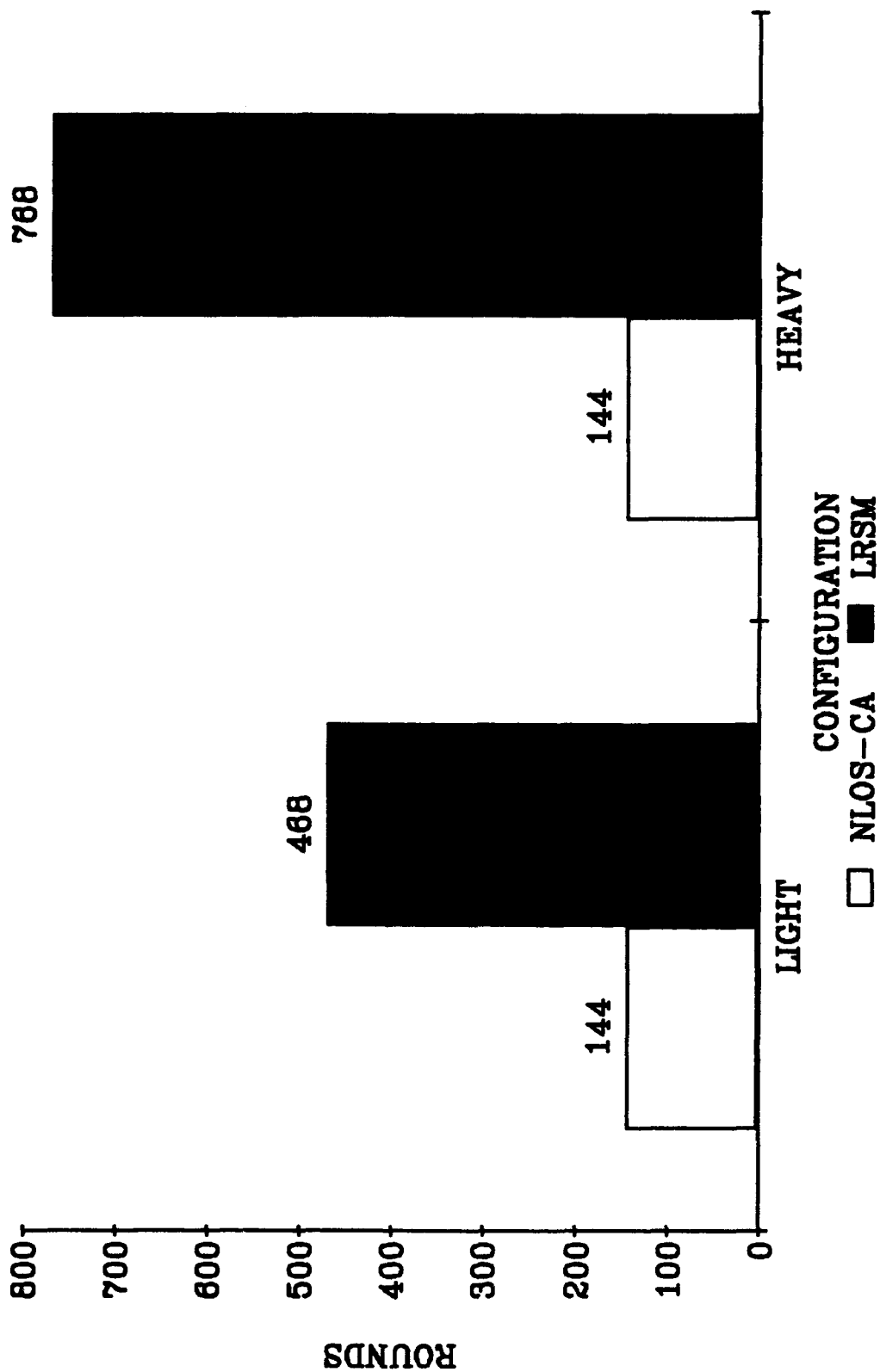


FIGURE 2-6 Brigade Stowed Rounds Comparison

# STOWED ROUND VOLUME CUBIC FEET

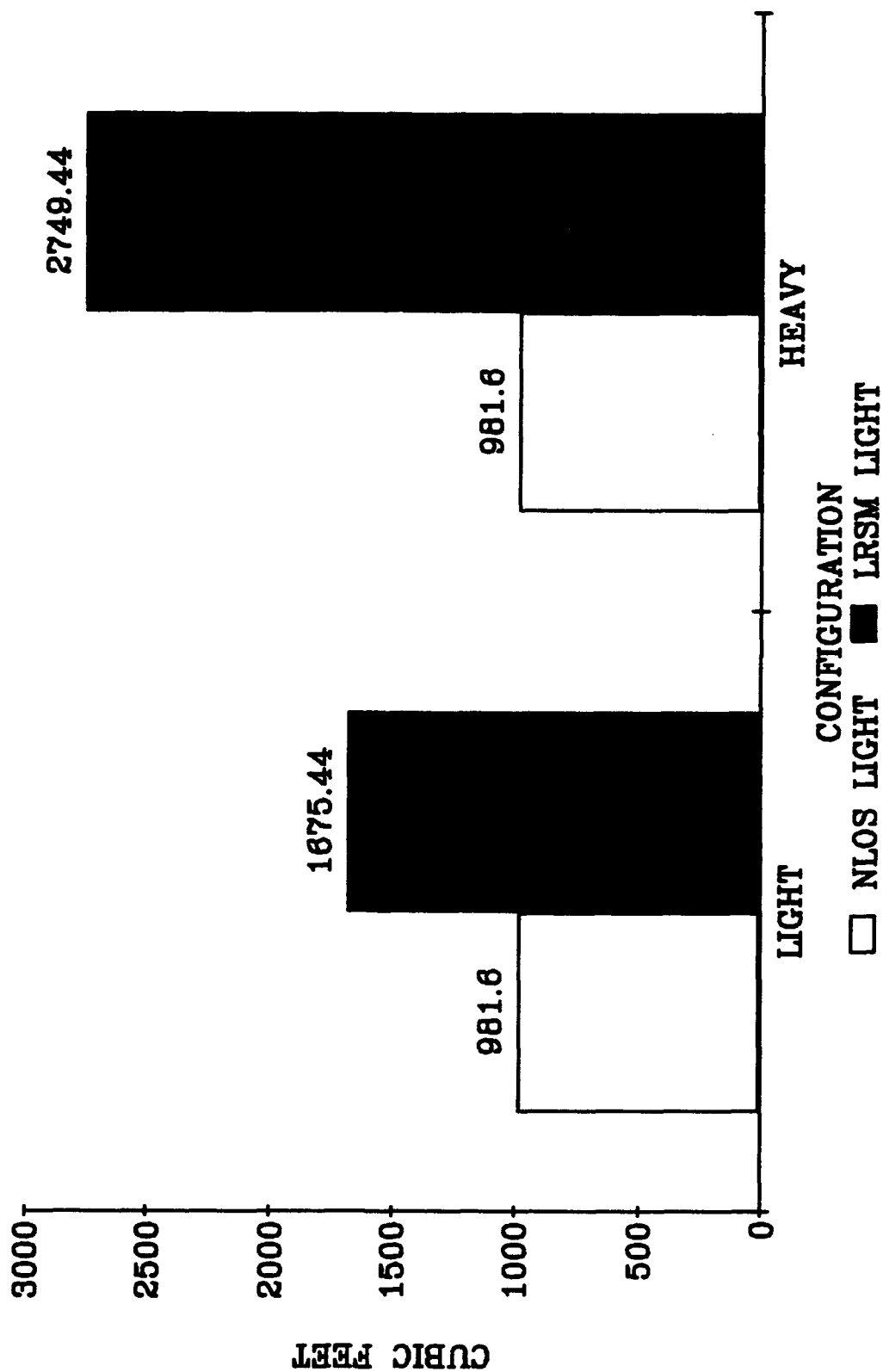
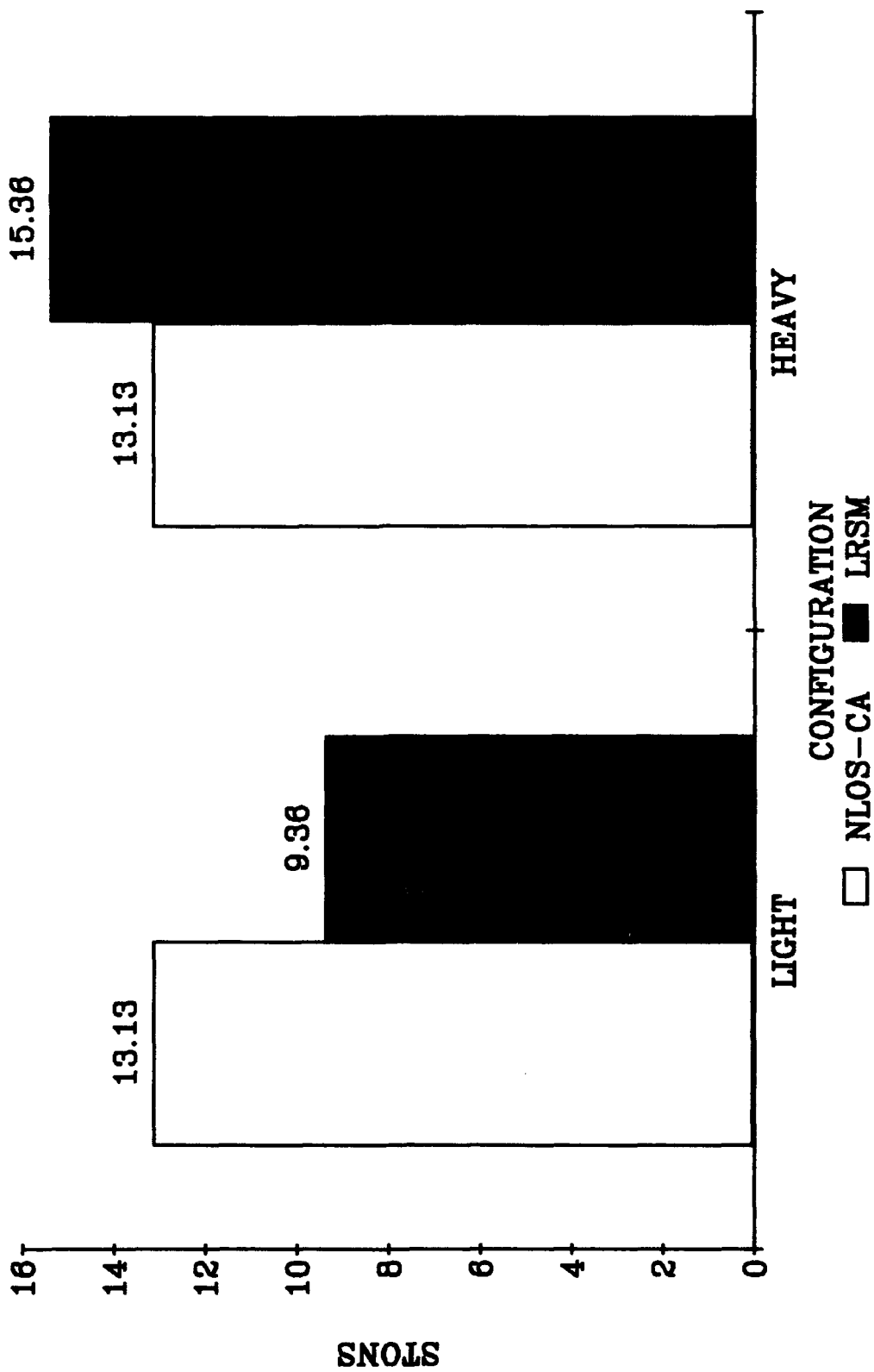


FIGURE 2-7 Brigade Stowed Rounds Volume

# STOWED ROUND WEIGHT STONS



**FIGURE 2-8 Brigade Stowed Rounds Weight**

**2.2.2.5 Storage Requirements.** Unique or special storage requirements may have a significant impact on logistics support facilities and support requirements. Storage characteristic and requirements for the NLOS-CA and LRSM are summarized below in Table 2-6.

**TABLE 2-6**  
**NLOS-CA/LRSM STORAGE CHARACTERISTIC**  
**AND REQUIREMENTS SUMMARY**

| VARIABLE               | NLOS     | LRSM |
|------------------------|----------|------|
| QTY-DISTANCE CLASS     | 1.1      | 1.1  |
| COMPATIBILITY CATEGORY | E        | D    |
| MHE                    | ON-BOARD | NONE |
| HAZARDS                | N/A      | N/A  |
| ENVIRONMENTAL CONTROL  | N/A      | N/A  |

Data for the NLOS-CA was provided by the USAOMMC&S and was certified by PM NLOS-CA. Data for the LRSM is based on the STRIX round and was provided by PM MORTAR. Quantity-distance classification determines storage configuration of bulk ammunition. Quantity-distance classifications are identical. Compatibility Category determines types of ammunition which can be stored in the same magazine in peacetime, or in the same stack in the field. Quantity-distance requirements must be applied when ammunition of different categories is stored together. Although compatibility categories are different, Table 2-6 FM 9-13 indicates there are no hazards. NLOS requires on-board MHE for loading/unloading missile packs onto the firing unit. This equipment is being acquired as part of the WS, however, logistics impact is included in consideration of that configuration. The difficulty of handling NLOS-CA missile packs can be compared to difficulties handling the LRSM missile Tube and base plate.

**2.2.3 MAINTENANCE.** Maintenance planning, organization, equipment and manpower for maintenance support is an important aspect of logistics supportability. The logistics concept determines how maintenance resources will be employed to achieve operational availability and readiness goals. Maintenance requirements which overload existing resources or require reconfiguration of maintenance support can have significant impact on the supportability of a WS individually and in the context of the total unit and total maintenance demands.

2.2.3.1 Test, Measurement, and Diagnostic Equipment (TMDE). TMDE is essential to the diagnosis and repair of "state of the art", high tech - electronics WSs now in the field. Requirements for new TMDE or additional TMDE equipment has a significant impact on logistics supportability. The logistics impact of TMDE becomes more critical as the fielding of new systems increases the demand on that equipment. The logistics impact of NLOS-CA alternatives was assessed in two dimensions:

- Type of TMDE.
- Quantity of TMDE.

The analysis addressed only system-specific TMDE requirements. NLOS-CA is an electronic-based system which relies heavily on TMDE for troubleshooting and maintenance. The Integrated Family of Test Equipment (IFTE) system will support NLOS-CA TMDE requirements. The Base Shop Test Facility (BSTF) provides Direct Support testing and repair of line replaceable units (LRUs). The Contact Test Set (CTS) will be used by forward support contact maintenance teams to augment on-board BIT capability for isolation of faulty LRUs. There are 13 LRUs in the gunner's station which will require TMDE support.

- 12 FUs per brigade x 14.8 operating hours per scenario/4 days per scenario = 44.4 brigade operating hours per day.
- 44.4 brigade operating hours per day/243 MTBUMA (FU) = .18 failures per day.
- .18 failures per day x 2.5 hrs per repair = .45 BSTF hours per day.
- .45 BSTF hours per day required/16 BSTF hours per day available per brigade = .03 BSTF per day required.

Although TMDE support requirements may not appear significant in the absolute, they must be assessed in the context of competing demands by other division WSs. In the current high-technology maintenance environment, each incremental addition to TMDE workload is significant. The LRSM does not require TMDE support. In summary, the logistics impact of NLOS-CA TMDE requirements is much stronger than the impact of LRSM requirements.

2.2.3.2 Built-in-Test/Built-in-Test Equipment (BIT/BITE). BIT/BITE identifies LRU failures automatically and assists the operator to isolate

the cause of those failures to components of the system. BIT/BITE is essential for electronics-based systems such as the NLOS-CA. BIT/BITE performance of the NLOS-CA system is summarized in Table 2-7 as follows:

**TABLE 2-7**

**NLOS-CA BIT/BITE SUMMARY**

|                                     |                                       |
|-------------------------------------|---------------------------------------|
| <b>DETECTION RATE</b>               | <b>80%</b>                            |
| <b>FALSE ALARM RATE</b>             | <b>5%</b>                             |
| <b>RESOLUTION</b>                   | <b>90% DETECTED FAILURES TO 1 LRU</b> |
| <b>SOURCE: PARA 3.5.1 MIS46200.</b> |                                       |

The LRSM is a mechanical system which does not require BIT/BITE. Because of the difference in technology and fault detection requirements, BIT/BITE is not directly comparable for these alternatives. No comparison rating was assigned for this MOP.

**2.2.3.3 Maintenance Concept.** The maintenance concept determines where each level and category of maintenance will be performed. The maintenance concept determines maintenance organization and the allocation of manpower requirements.

A. NLOS-CA. NLOS-CA will be supportable by the standard Army logistics systems. The standard four level maintenance support concept will be applied to NLOS-CA GFE (vehicle, radio, MHE, etc.). The NLOS FU will employ a three level maintenance concept: Unit, Direct Support (DS) and Depot. There is no organic maintenance capability for NLOS FU in the NLOS Company. Operators will detect LRU failure via BIT/BITE. Maintenance will be provided by Forward Support Contact Teams (FSCTs) from the Forward Support Base (FSB). These teams will use the CTS to augment BIT isolation of failed LRUs. They will remove and replace failed LRUs. The BSTF provides diagnostics and repair of failed LRUs. Failed shop replaceable units (SRUs) are repaired at Depot.

B. LRSM. The LRSM will employ the standard four-level (Unit, DS, General Support (GS), and Depot) maintenance concept. Unit level maintenance of mortar is negligible. DS and GS maintenance/repair of LRSM tube is the same as that for the 120mm mortar tube. There is no field maintenance authorized for either the LRSM or NLOS round. They will both be certified rounds. Maintenance concepts for Alternatives 1 and 2 can be summarized as follows: No non-standard/unique facilities or equipment will be required to support either alternative.

The maintenance concepts for both NLOS-CA and LRSM are summarized in Table 2-8.

TABLE 2-8

MAINTENANCE CONCEPT SUMMARY

| SYSTEM | L I G H T |         | H E A V Y |         | R O U N D |      |
|--------|-----------|---------|-----------|---------|-----------|------|
|        | NLOS      | LRSM    | NLOS      | LRSM    | NLOS      | LRSM |
| UNIT   | FSB       | N/A     | FSB       | N/A     | N/A       | N/A  |
| DS     | FSB       | MSB     | FSB       | MSB     | N/A       | N/A  |
| GS     | N/A       | GS UNIT | N/A       | GS UNIT | N/A       | N/A  |

The LRSM will fit completely within the existing maintenance organization and concept. The NLOS-CA on the other hand will increase the maintenance burden on FSCTs significantly. In addition, the NLOS-CA will increase the support burden on the BSTF direct support facility. The logistics impact of the NLOS-CA maintenance concept is very strongly greater than the LRSM impact.

2.2.4 Reliability, Availability and Maintainability (RAM). RAM measures operational readiness, mission success, maintenance manpower requirements and logistics support requirements. They ultimately determine quantities of repair parts and maintenance manpower requirements. RAM data for the NLOS-CA and LRSM were obtained from Mortar, NLOS-CA and Carrier Program Offices. Raw data used in this analysis is provided in Appendix F. The results are summarized below in Table 2-9:

TABLE 2-9

RAM SUMMARY NLOS-CA and LRSM

|                |    | Light & Heavy<br>N L O S | L R S M |       |
|----------------|----|--------------------------|---------|-------|
|                |    |                          | LIGHT   | HEAVY |
| MTBOMF         |    | 161                      | 152     | 79.8  |
| MTBUMA         |    | 22.9                     | 26.4    | 13.1  |
| MTTR           | UL | .72                      | 1.4     | N/A   |
|                | DS | 2.25                     | 2.1     | N/A   |
|                | GS | 5.5                      | 5.5     | N/A   |
| MR             |    | .12                      | .13     | .38   |
| A <sub>c</sub> |    | .93                      | .97     | .91   |

**2.2.4.1 Mean Time Between Operational Mission Failure (MTBOMF).** MTBOMF is a measure of mission success. It is the period between failures which prevent the system from performing its mission. The interval between operational mission failures is measured in hours, miles and rounds for the NLOS-CA, carrier subsystems and mortar tubes respectively. These values were converted to hours as described in Appendix F RAM Analysis to this report. MTBOMF reflects both the supportability impacts and the operational effectiveness impacts of the WSs. A lower MTBOMF value indicates more frequent operational failures, and drives more maintenance and system downtime. The period between operational failures for the heavy LRSM is more than half that of the NLOS-CA. The MTBOMF of the light version of the LRSM is only somewhat less than that for the light version of the NLOS. This reflects the impact of the carrier on reliability of the WS (see Figure 2-9 for MTBOMF hours graph). In summary, the logistics impact of the MTBOMF of the LRSM is moderately greater than the impact of the NLOS-CA.

**2.2.4.2 Mean Time Between Unscheduled Maintenance Actions (MTBUMA).** MTBUMA is a measure of maintenance manpower requirements. It measures the frequency of maintenance actions. The smaller the interval between unscheduled maintenance actions, the more frequently maintenance support will be required, and the greater the logistics impact. The MTBUMA for the NLOS-CA is somewhat less than the light version of the LRSM, but approximately 69% greater than the heavy version (see Figure 2-10 for MTBUMA hours graph). In summary, the logistics impact of the LRSM is moderately greater than the impact of the NLOS-CA.

**2.2.4.3 Mean Time To Repair (MTTR).** MTTR measures the average time required to complete a maintenance action. Combined with MTBUMA it determines maintenance workload (See graph at Figure 2-11). The MTTR is approximately equal for the light versions of the NLOS-CA and LRSM, reflecting the dominance of the carrier in assessing the maintainability of both systems. MTTR data was not available for the heavy version of the LRSM. In summary, the logistics impact of MTTR is equal for both NLOS-CA and LRSM.

**2.2.4.4 Maintenance Ratio (MR).** The MR measures maintenance workload per operating metric. System level MR for both alternatives are summarized as follows (see Figure 2-12 for MR graph). MRs for light versions of the alternatives are approximately equal. The Heavy version of the LRSM has a much higher MR than the light versions of either alternative. This reflects the impact of carrier maintenance for the tracked LRSM vehicle.

# MEAN TIME BETWEEN MISSION FAILURE (MTBOMF) HOURS

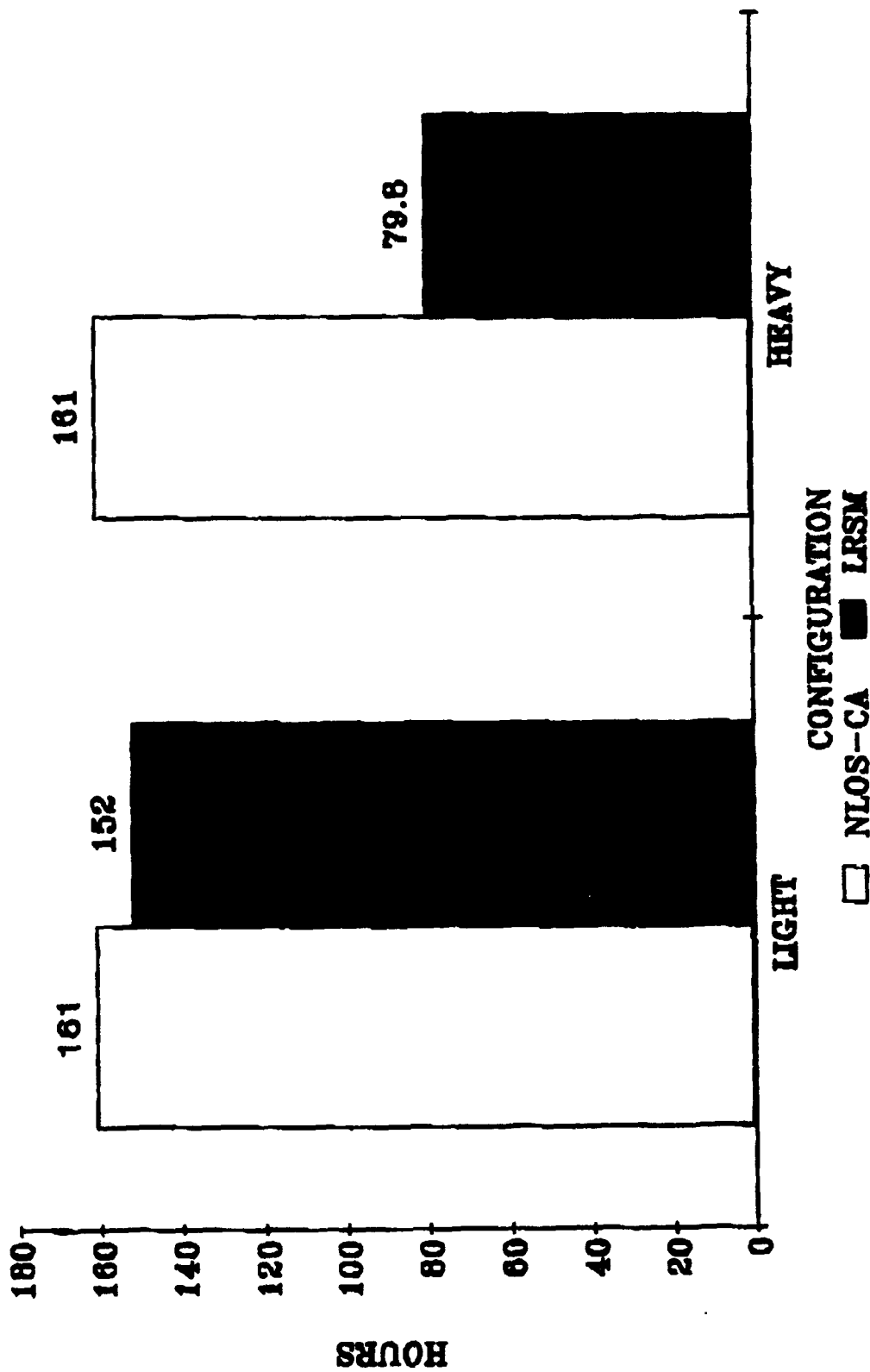


FIGURE 2-9 MTBOMF Comparison

# MEAN TIME BETWEEN MAINTENANCE ACTIONS (MTBUMA) HOURS

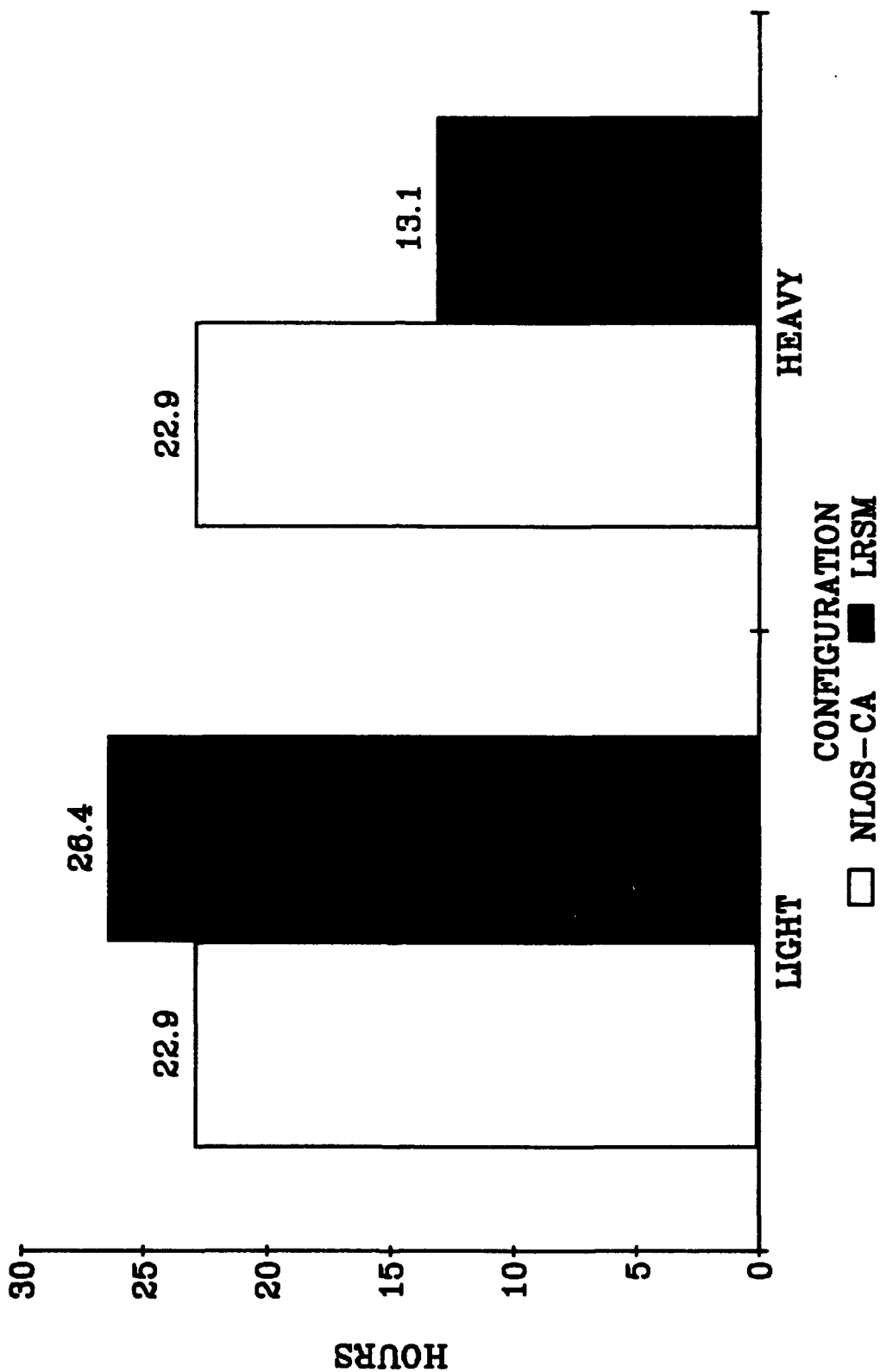


FIGURE 2-10 MTBUMA Comparison

# MEAN TIME TO REPAIR (MTTR) HOURS

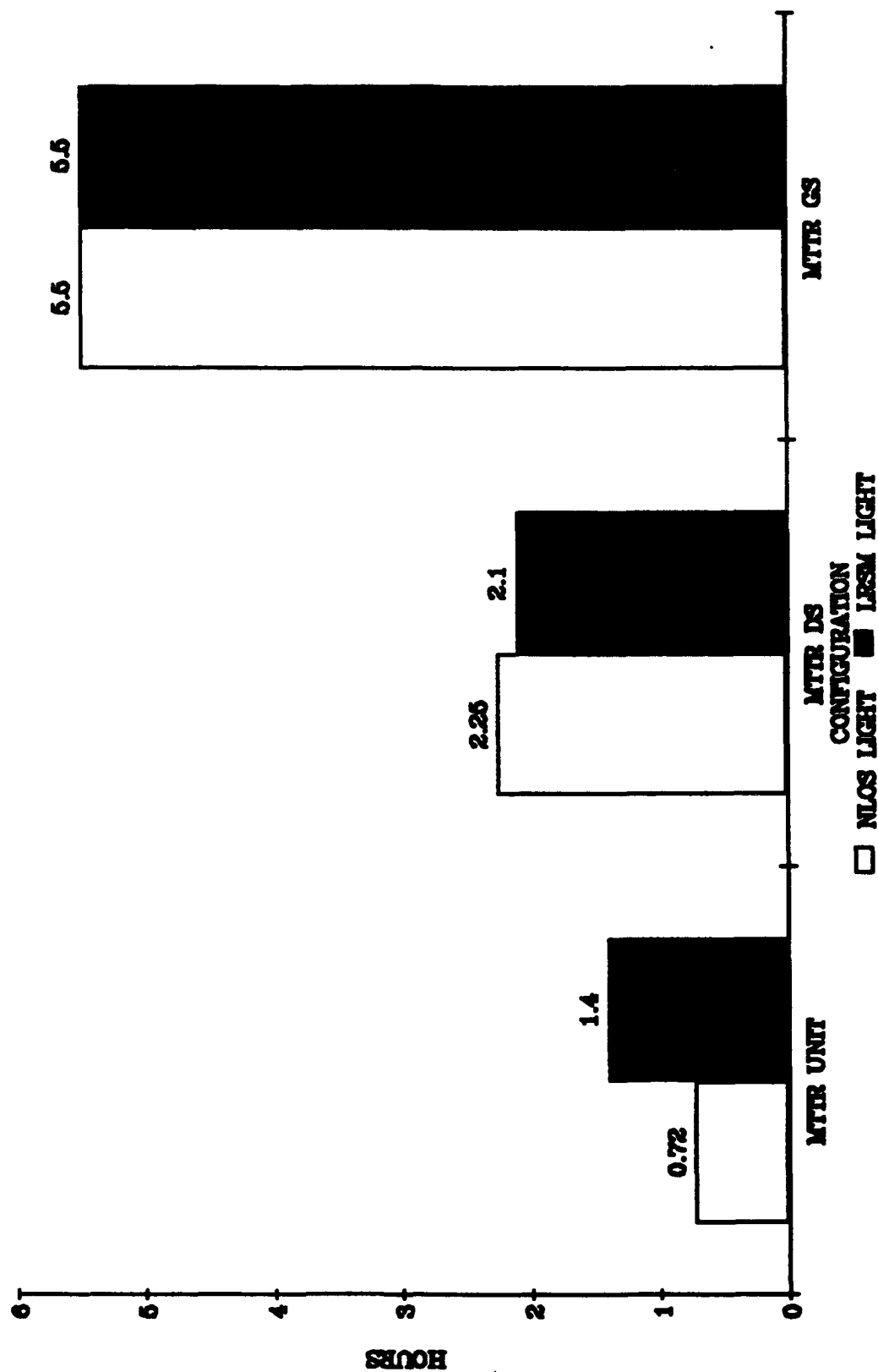


FIGURE 2-11 MTTR Comparison

# MAINTENANCE RATIO (MR) MANHOURS PER OPERATING HOUR

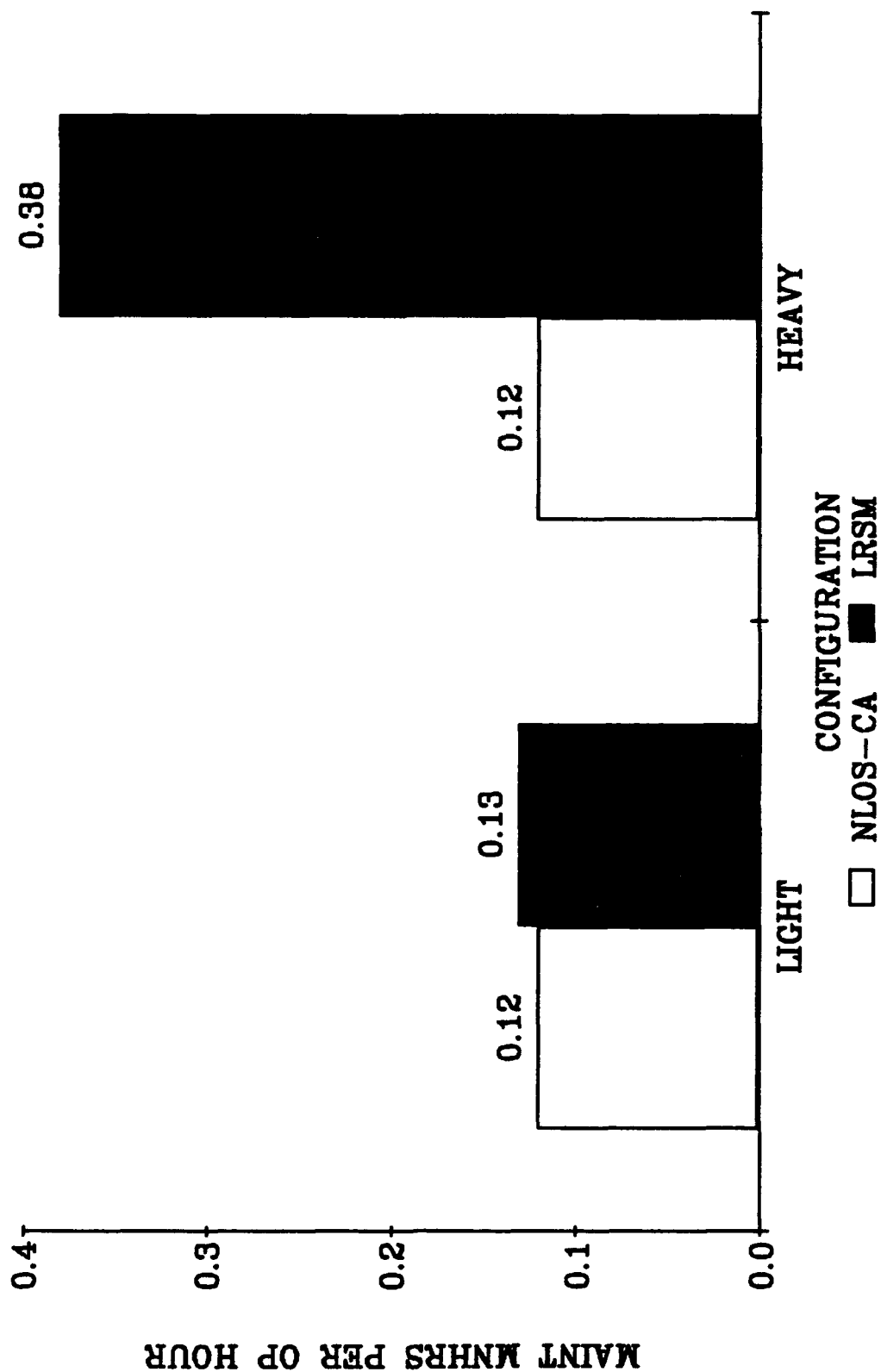


FIGURE 2-12 MR Comparison

2.2.4.5 Operational Availability ( $A_o$ ).  $A_o$  represents the portion of time a system is either operating or capable of operating in a specific operating and support environment.  $A_o$  is calculated as follows:

$$A_o = \frac{\text{Operating Time} + \text{Standby Time}}{\text{Operating Time} + \text{Standby Time} + \text{Total Corrective Maintenance Time} + \text{Total Preventive Maintenance Time} + \text{Admin \& Logistics Downtime}}$$

As the equations above demonstrate,  $A_o$  is a function of all other RAM values and as such, is the only MOE addressed in this LIA study. For this study,  $A_o$  values were provided by Mortar and NLOS-CA program offices.  $A_o$  for the NLOS-CA is approximately equal to the heavy version of the LRSM and less than the light version reflecting the supportability impact of the NLOS and the Heavy LRSM. In summary, the logistics impact of the  $A_o$  of the NLOS-CA is marginally greater than the impact of the LRSM.

2.2.4.6 Direct Productive Annual Maintenance Man-hours (DPAMMH) Comparison. DPAMMH measures the total maintenance workload of a WS. It measures the direct impact of a WS on the maintenance force structure. The DPAMMH by MOS and maintenance level were provided for each WS by respective program managers. Raw data used in this analysis is displayed in Appendix F. The DPAMMH for the NLOS-CA and LRSM WSs and major components is summarized in Table 2-10 (see Figure 2-13 for graphical comparison).

TABLE 2-10  
DIRECT PRODUCTIVE ANNUAL MAINTENANCE MAN-HOURS  
SUMMARY BY SYSTEM

| L I G H T      |         |     |      |         |       |        |
|----------------|---------|-----|------|---------|-------|--------|
| MAINT<br>LEVEL | N L O S |     |      | L R S M |       |        |
|                | SYSTEM  | FU  | VEH  | SYSTEM  | TUBE  | VEH    |
| UNIT           | 240     | --- | 240  | 240     | - - - | 240    |
| DS             | 1875    | 725 | 1150 | 1163    | 13    | 1150   |
| GS             | 87      | --- | 87   | 96.5    | 9.5   | 87     |
| TOTAL          | 2202.0  | 725 | 1477 | 1499.5  | 22.5  | 1477   |
| H E A V Y      |         |     |      |         |       |        |
| MAINT<br>LEVEL | N L O S |     |      | L R S M |       |        |
|                | SYSTEM  | FU  | VEH  | SYSTEM  | TUBE  | VEH    |
| UNIT           | 240     | --- | 240  | 1076.7  | - - - | 1076.7 |
| DS             | 1875    | 725 | 1150 | 237.8   | 16.8  | 221.1  |
| GS             | 87      | --- | 87   | 160.0   | 11.2  | 148.8  |
| TOTAL          | 2202    | 725 | 1477 | 1474.5  | 28.0  | 1446.6 |

# DIRECT PRODUCTIVE MAINTENANCE MANHOURS

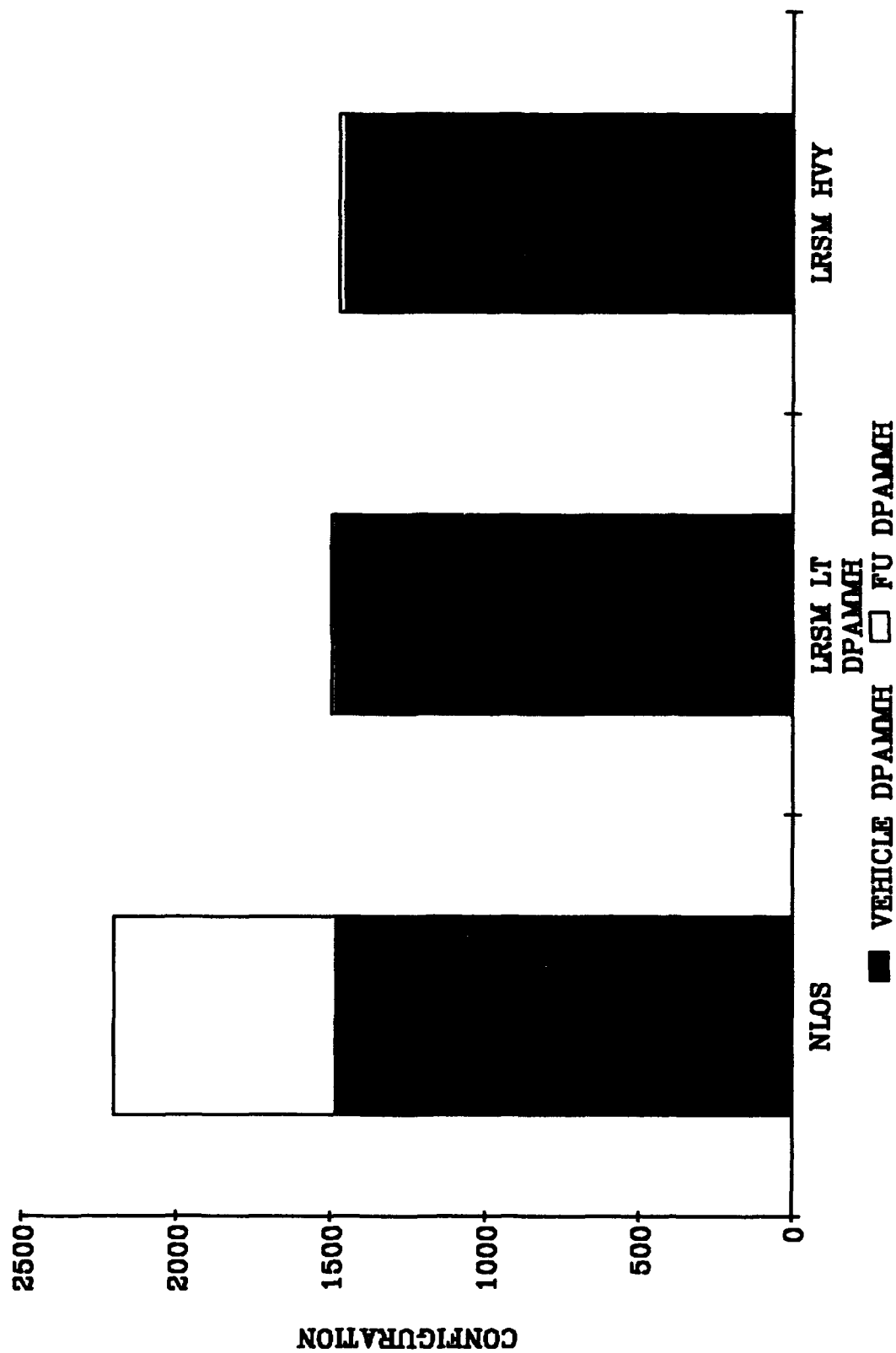


FIGURE 2-13 DPMMH Summary

By inspection, the direct maintenance workload for the LRSM is 30% lower than the NLOS-CA in both heavy and light configurations. Further analysis shows that this difference is due almost entirely to the maintenance requirements of the NLOS firing unit. The maintenance workload of both HHV and M1064 carriers is similar for both WSS. However, the maintenance requirements of the mortar are much less than the maintenance requirements of the NLOS-CA gunner's station and launcher. Because there is no unit level maintenance support capability at the organizational level, unit level maintenance workload is allocated to the direct support level. Therefore, the impact of the difference in DPAMMH falls almost entirely on the DS organization. The impact of the differences in DPAMMH between the two alternative systems becomes more pronounced when total DPAMMH is compared at the Brigade level. Total brigade maintenance workload is summarized in Table 2-11. Twelve NLOS systems and six LRSMs will be fielded in each Brigade, respectively.

TABLE 2-11

DIRECT PRODUCTIVE ANNUAL MAINTENANCE MAN-HOURS  
SUMMARY BY BRIGADE

| H E A V Y      |         |      |       |         |       |       |
|----------------|---------|------|-------|---------|-------|-------|
| MAINT<br>LEVEL | N L O S |      |       | L R S M |       |       |
|                | SYSTEM  | FU   | VEH   | SYSTEM  | FU    | VEH   |
| UNIT           | 2880    | 0    | 2800  | 12920   | 0     | 12920 |
| DS             | 22500   | 8700 | 13800 | 28545   | 202   | 2653  |
| GS             | 1044    | 0    | 1044  | 1920    | 134   | 1786  |
| TOTAL          | 26424   | 8700 | 17724 | 17695   | 336   | 17359 |
| L I G H T      |         |      |       |         |       |       |
| MAINT<br>LEVEL | N L O S |      |       | L R S M |       |       |
|                | SYSTEM  | FU   | VEH   | SYSTEM  | FU    | VEH   |
| UNIT           | 2880    | ---  | 2800  | 2880    | - - - | 2880  |
| DS             | 22500   | 8700 | 13800 | 13956   | 156   | 13800 |
| GS             | 1044    | ---  | 1044  | 1158    | 114   | 1044  |
| TOTAL          | 26424   | 8700 | 17724 | 17994   | 270   | 17724 |

- Three each 120 mm LRSM systems per Battalion, two infantry Battalions per Heavy Brigade.
- Although a light Brigade has three infantry Battalions, LRSM

fielding will be achieved by fielding two additional 120mm mortar systems and the conversion of one existing system in each Brigade.

The differences in maintenance impact are apparent. In summary, the logistics impact of NLOS-CA DPAMMH requirements is moderately greater than the impact of LRSM requirements.

#### 2.2.5 Transportation

2.2.5.1 **Class III - Fuel.** The 2500 gallon tanker is used to transport bulk fuel forward from the Corps. Based on guidance from the U.S. Army Quartermaster School, tanker availability is 90% and each tanker completes 2 round trips per day. Daily Brigade fuel consumption requirements were calculated in the supply analysis detailed in **Appendix D** and summarized in Paragraph 2.3.2 above.

Tanker support requirements were calculated as follows and summarized in **Table 2-12** below (see **Figure 2-14** for Fuel Transportation Requirements graphic comparison):

Payloads per day = (Gallons per day consumption/2500 gallons per payload)

Tankers per day = (Payloads per day/2 Payloads (trips) per day per Tanker) x 1.10

**TABLE 2-12**

#### **CLASS III TRANSPORTATION REQUIREMENTS SUMMARY**

|                            | L I G H T |        | H E A V Y |        |
|----------------------------|-----------|--------|-----------|--------|
|                            | NLOS      | LRSM   | NLOS      | LRSM   |
| <b>GAL PER DAY PER BDE</b> | 245.75    | 245.75 | 485.18    | 851.72 |
| <b>GAL PER TANKER</b>      | 2500      | 2500   | 2500      | 2500   |
| <b>PAYLOADS PER DAY</b>    | 0.098     | 0.098  | 0.183     | 0.341  |
| <b>TRIPS PER DAY</b>       | 2         | 2      | 2         | 2      |
| <b>TANKERS PER DAY</b>     | 0.054     | 0.054  | 0.101     | 0.187  |

2.2.5.2 **Class V - Ammunition.** The Palletized Load System (PLS) will be used to move ammunition requirements forward from Corps storage facilities. The PLS consists of a prime mover and a trailer. Payload capacities of both components are identical. The payload dimensions of the PLS and trailer are summarized in **Table 2-13** below:

# FUEL TRANSPORTATION REQUIREMENTS TANKER PER DAY PER BDE

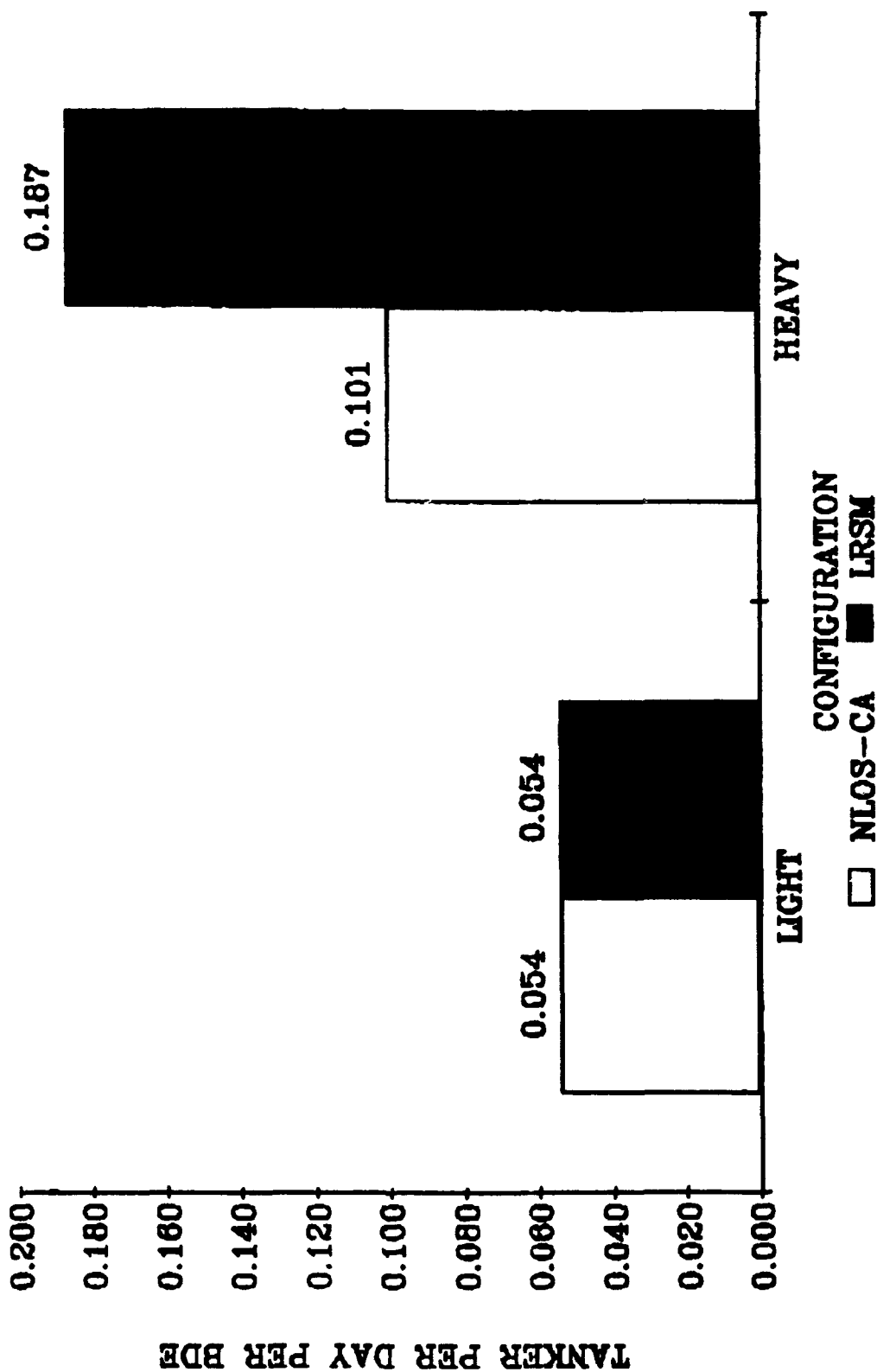


FIGURE 2-14 Fuel Transportation Summary

Table 2-13

**PLS PAYLOAD DIMENSIONS SUMMARY**  
(Prime mover and trailer)

| WIDTH (IN) | LENGTH (IN) | HEIGHT (IN) | STONS |
|------------|-------------|-------------|-------|
| 90.5       | 249         | 63.7        | 16.5  |

Hauling capacity for LRSM and NLOS is calculated as follows:

**LRSM**

LRSM Pallet Dimensions: Width = 39 in  
Length = 43 in  
Height = 46 in  
Weight = 484 lbs

**LRSM Payload dimensions:**

Payload width/pallet width = 2.3, 2 pallets wide.  
Payload length/pallet length = 5.79, 5 pallets long  
Payload height/pallet height = 1.38, 1 pallet high

Prime Mover Payload Capacity = 2x5x1 = 10 pallets per truck  
Trailer Payload Capacity = 2x5x1 = 10 pallets per trailer  
TOTAL PLS Capacity = 20 LRSM pallets

Weight Check= 20 pallets x 484 lbs per pallet/2000 lbs per ton =  
4.84 tons < 16.5 ton capacity.

**NLOS**

NLOS Pallet Dimensions: Width = 64.5 in  
Length = 86in  
Height = 12.75 in  
Weight = 1020 lb

**NLOS Payload dimensions:**

Payload width/pallet width = 1.4, 1 pallet wide.  
Payload length/pallet length = 2.89, 2 pallets long  
Payload height/pallet height = 4.99, 4 pallet high

Prime Mover Payload Capacity = 1x2x4 = 8 pallets per truck  
Trailer Payload Capacity = 1x2x4 = 8 pallets per trailer  
TOTAL PLS Capacity = 16 LRSM pallets

Weight Check = 8 pallets x 1020 lbs per pallet/2000 lbs per ton =  
4.08 tons < 16.5 ton capacity.

Transportation support requirements were calculated as follows:

$$\text{Payloads per day} = (\text{Pallets per day consumption/pallets per PLS Payload})$$

$$\text{PLS per day} = (\text{Payloads per day}/2 \text{ Payloads(trips) per day per PLS}) \times 1.10$$

Ammunition consumption is obtained from the ammunition consumption analysis in Appendix E. Assume two trips per day per vehicle and 90% availability.

The results of this analysis are summarized in Table 2-14 below (see Figure 2-15 for graphical comparison):

TABLE 2-14

AMMUNITION TRANSPORTATION SUMMARY

|                  | L I G H T |      | H E A V Y |      |
|------------------|-----------|------|-----------|------|
|                  | NLOS      | LRSM | NLOS      | LRSM |
| PALLETS PER DAY  | 13        | 17   | 30        | 40   |
| PALLETS PER VEH  | 16        | 20   | 16        | 20   |
| PAYLOADS PER DAY | .081      | .85  | 1.88      | 2.00 |
| TRIPS PER DAY    | 2         | 2    | 2         | 2    |
| PLS PER DAY      | .045      | .043 | 1.04      | 1.00 |

Ammunition transportation requirements for the LRSM are only moderately greater than for NLOS. In the light configuration, neither system requires a full additional PLS.

**2.2.6 Transportability/Deployability.** The transportability/deployability analysis assesses the ability of a unit and WS to accomplish intra- and inter-theater movement. Transportability is defined as the inherent capability of a WS to be moved efficiently by transportation assets and modes of transport. Deployability is the capability of a unit to be moved intra-Continental United States (CONUS), intra-theater or inter-theater to support military operations. The Transportation Engineering Agency (TEA) of the Military Traffic Management Command (MTMC) performed a transportability/deployability sub-analysis for the NLOS-CA COEA alternatives. The results of that study are summarized below. Detailed analysis is described in Appendix J.

**2.2.6.1 Transportability.** All systems are readily transportable by available transport assets and modes of transport, although the size and weight of the LRSM Heavy Configuration may require special routing or permits for highway transportation during intra-CONUS or intra-theater

# AMMUNITION TRANSPORT REQUIREMENTS TRUCKS PER DAY PER BDE

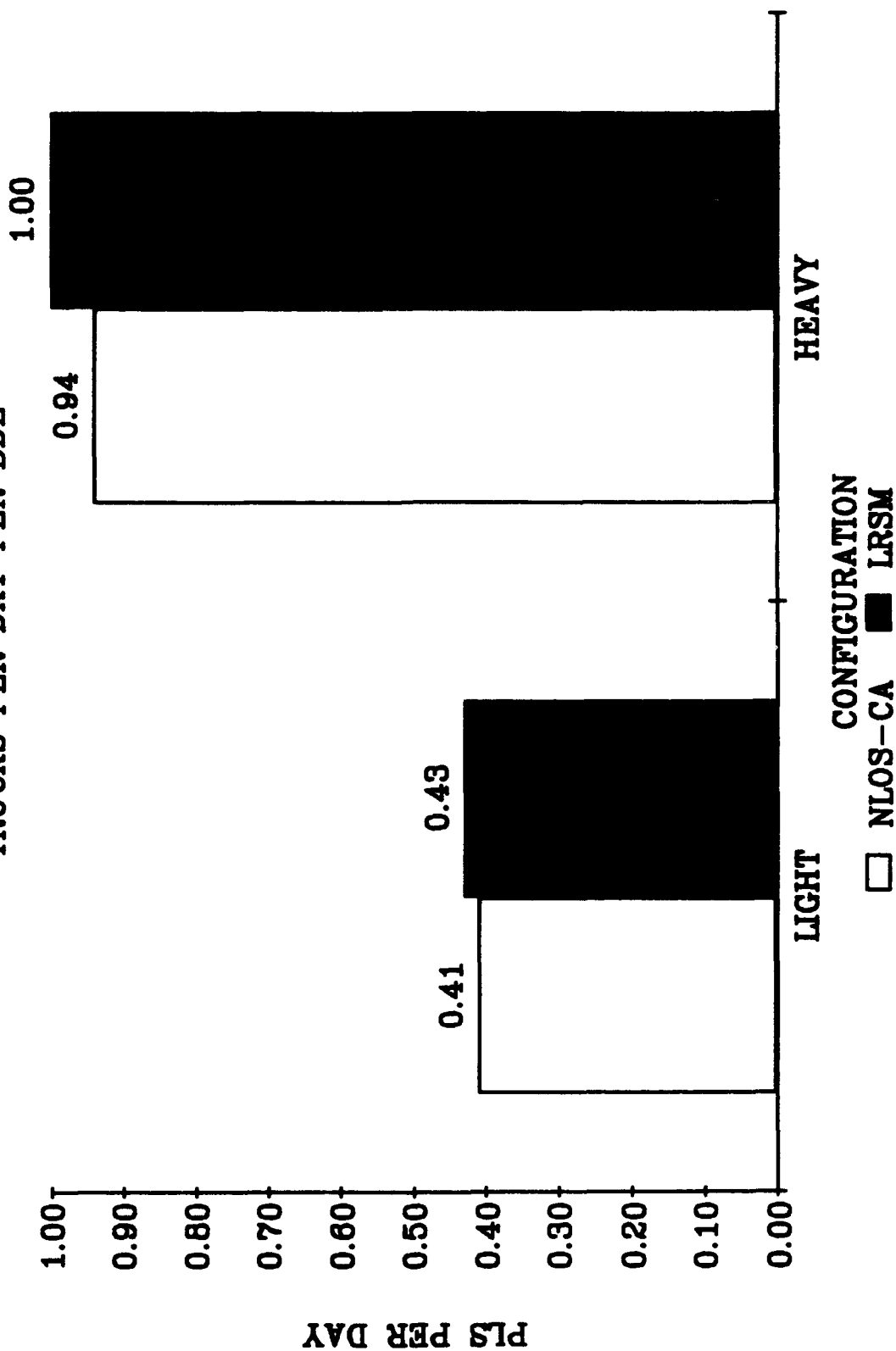


FIGURE 2-15 Ammunition Transportation Summary

road movement. The LRSM will also not be helicopter transportable for tactical movement due to size and weight limitations. Transportability values for the two configurations are summarized in Table 2-15.

**TABLE 2-15**  
**NLOS-CA TRANSPORTABILITY SUMMARY**

|   | LIGHT     |       | HEAVY   |                             |
|---|-----------|-------|---------|-----------------------------|
|   | NLOS-CA   | LRSM  | NLOS-CA | LRSM                        |
| HIGHWAY   |           |       |         |                             |
| CONUS   | YES       | YES   | YES     | SPECIAL ROUTING PERMITS (1) |
| OCONUS  | YES       | YES   | YES     |                             |
| RAIL  | YES       | YES   | YES     | YES                         |
| AIR   |           |       |         |                             |
| C-130   | YES       | YES   | YES     | YES                         |
| C-141   | YES       | YES   | YES     | YES                         |
| C-5   | YES       | YES   | YES     | YES                         |
| ROTARY  | CH-47 (2) | CH-47 | CH-47   | NO                          |
| SEA   |           |       |         |                             |
| STRAT TRANSPORT   | YES       | YES   | YES     | YES                         |
| LOTS (3)  | YES       | YES   | YES     | YES                         |
| NOTES: (1) Width may require special routing for highway movement.<br>(2) External Air Transport by CH-47 Helicopter.<br>(3) Logistics Over the Shore (LOTS) - LARC-LX and larger lighterage vessels. |           |       |         |                             |

**2.2.6.2 Deployability.** Both alternatives are readily deployable using available transport assets, although the light versions of both NLOS-CA and LRSM have less impact due to differences in size of the heavy LRSM WS configuration and the unit TOE. Deployability requirements are summarized in Table 2-16.

**TABLE 2-16**  
**INFANTRY BRIGADE W/NLOS-CA COMPANY**  
**DEPLOYABILITY SUMMARY**

|   | LIGHT   |       | HEAVY   |       |
|---|---------|-------|---------|-------|
|   | NLOS-CA | LRSM  | NLOS-CA | LRSM  |
| DEPLOYMENT TIME (1)   | 32 HR   | 32 HR | 32 HR   | 32 HR |
| RAILCARS  | 65      | 66    | 415     | 416   |
| AIR SORTIES (2)   |         |       |         |       |
| C-141   | 57      | 58    | 271     | 283   |
| C-5   | N/A     | N/A   | 221     | 228   |
| C-130   | 116     | 120   | N/A     | N/A   |
| NOTES: (1) Air Transport: Includes loading, unloading one-way flight times with intermodal stops, Ft. Benning, GA, to Southwest Asia.<br>(2) C-141 and C-5 sorties are strategic movement. C-130 values are for tactical movement. The Heavy Infantry Brigade is not C-130 transportable. |         |       |         |       |

**2.2.7 Recoverability.** Recoverability includes the consideration of the resources required to retrieve damaged and inoperable vehicles from the battle field, and between support locations. This assessment considers two dimensions of this issue:

- **Equipment.** Is existing equipment capable of performing recovery missions for the proposed WS?
- **Resources.** Are sufficient resources to meet recovery workload requirements?

Light and heavy configurations of both alternatives are constructed on the chassis of standard tactical vehicles (HMMWV and M1064). Recovery equipment and vehicles currently in the field and assigned to TOE units is capable of recovering these systems. Recovery vehicles are assigned to notional TOEs used for this study. It is therefore concluded that sufficient recovery resources are available to service the needs of organic vehicles, although the Heavy configuration of the LRSM may tax organic recovery resources due to its size, weight and tracked configuration. In summary, the logistics impact of recoverability for both alternatives is equal.

**2.2.8 Explosive Ordnance Disposal (EOD).** EOD support is responsible for detecting, identifying, rendering safe, evacuation, and disposal of unexploded ordnance. There are two dimensions to the logistics impact of new ordnance: (a) special process, equipment or handling requirements, and (b) unexploded ordnance volume. Special fuzing, explosives, or load (i.e., Nuclear, Biological and Chemical) are some of the design characteristics which could increase the logistics impact of new ordnance. All data received in this study indicates, that in spite of sophisticated guidance systems, fuzing and explosive loads of NLOS and LRSM rounds are conventional and will require no special handling or equipment. Render safe procedures have not been defined for these rounds and their evaluation is beyond the scope of this study.

The use of sub-munitions in anti-personnel and mine carrying munitions increases the density of unexploded ordnance on the battlefield significantly. EOD support workload and logistics impact increases accordingly when new, sub-munition carrying rounds are fielded. Neither NLOS nor LRSM will carry sub-munitions as currently defined. However, LRSM firing rate is almost two to one versus NLOS. This increased volume can be expected to increase the density of unexploded ordnance. Additionally, man-in-the loop guidance of NLOS can be expected to decrease the incidents of unexploded ordnance versus LRSM.

**2.2.9 Standardization and Interoperability.** Standardization and interoperability are defined in AR 700-127, Integrated Logistics Support:

A. Standardization: The process by which materiel system managers achieve maximum subsystem commonality with other WSs in the Department of the Army, other services and NATO allied nations to reduce support requirements and to attain interoperability objectives.

B. Interoperability: The ability of materiel systems, units, or forces to provide services to and accept services from other systems units or forces.

Standardization is concerned primarily with the use of common hardware systems and components to achieve support efficiencies. NLOS-CA and LRSM were assessed for the logistics impact of standardization in four subsystem categories:

- Carrier/Vehicle: All configurations of both alternatives are mounted on standard tactical/combat vehicles. Standardization of NLOS-CA and LRSM in carrier design are equal.
- Communications: All configurations of both alternatives will use standard Army SINCGARS radio communication systems. Standardization in the communications category is equal.
- System: The NLOS gunner's station and launcher are unique modules. Although there may be some use of common items at the component/subsystem level, the degree of standardization is quite low. The LRSM "system" is the standard Battalion Mortar System (BMS) 120mm mortar now being fielded light and heavy forces. The degree of standardization of the LRSM weapon is very much stronger than that of the NLOS weapon.
- Round: The NLOS missile pack includes both missile and launch canister. This subsystem is unique in design and requires special support. The LRSM will use a modified mortar round. This round has different dimensions than the standard mortar round and will require some special handling because of the guidance system. The LRSM round is much more standardized than the NLOS round due to the complexity of the missile pack.

Interoperability was assessed by the WSs ability to operate functionally within existing or planned functions.

A. Communications: Both alternatives use SINCGARS radios and are fully interoperable with existing battlefield communications systems. Communications interoperability is equal.

B. Command & Control: Both systems are interoperable with existing command and control/fire control systems. The performance

parameters and employment concept for the LRSM is not fully developed and at this points exhibits some risk in terms of doctrine employment and control. The NLOS-CA is moderately more interoperable with the command & control system than the LRSM.

C. Maintenance Support: Both systems are interoperable with the existing maintenance support system. The LRSM is somewhat more interoperable because the mortar and carrier are identical with companion systems. Although the NLOS is supportable by existing DS resources, it will require unique expertise and test program set (TPS) support for the TMDE. Both alternatives are equally interoperable in the maintenance area.

D. Supply Support: Both systems are interoperable with the existing supply systems. The LRSM is somewhat more attractive because the NLOS requires handling and delivery of non-standard missile packs throughout the area of operations. The LRSM is moderately more interoperable than the NLOS-CA.

E. Summary: The logistics impact of standardization and interoperability of the NLOS-CA is moderately greater than the impact of the LRSM.

# **NON-LINE OF SIGHT - COMBINED ARMS (NLOS-CA)**

## **MANPOWER, PERSONNEL AND LOGISTICS IMPACT ANALYSES (LIA)**

### **CHAPTER 3**

**3.0 MANPOWER AND PERSONNEL ANALYSIS.** The manpower and personnel analysis (MPA) addressed the system specific and the supporting items of equipment to determine the manpower requirements for the NLOS-CA Fiber Optic Guided Missile (FOG-M) and the alternative Long Range Smart Mortar (LRSM) systems in Heavy and Light Division configurations. This analysis included the verification of system specific operator and maintainer MOSs. The analysis began with an extensive data collection effort, obtaining the required Tables of Organization and Equipment (TOEs), associated Basis of Issue Plans (BOIPs), maintenance data for all system specific and supporting items of equipment, daily fuel and ammunition consumption rates, bulk and weight data for ammunition resupply and capacity of ammunition transport equipment. The next step in the analysis was to examine the accumulated data to determine the identity and densities of the system specific and supporting items of equipment for each of the alternatives. Once the equipment was identified and the densities determined for each alternative, the Maintenance Ratios/Annual Maintenance Man-Hours and the equipment usage rates by MOS and by maintenance level (Organizational, Intermediate Direct Support (IDS) and Intermediate General Support (IGS)), these data were then loaded into the Manpower Requirements Determination (MRD) model. It should be noted that Depot level maintenance is outside the scope of this analysis.

Through the application of standard army manpower algorithms (AR 570-2), the annual available MOS productive man-hours (AAMPM), and the Standard of Grade Authorizations (SGA) (AR 611-201) the workload driven manpower requirements by MOS, grade, and maintenance level were determined. The crew/operator manpower requirements as provided by the Army were then incorporated into the MRD model as well as the manpower required for fuel, and ammunition resupply. The results of this analysis is displayed at MOS and grade level of detail for each of the alternatives in whole man numbers for the NLOS-CA Company, and in fractional numbers for the supporting IDS and IGS activities.

**3.1 GENERAL.** The purpose of the NLOS-CA Manpower and Personnel analysis was to identify, using the best available data, the manpower requirements for one Brigade level NLOS-CA Company for each of the following alternatives and configurations:

NLOS-CA COMPANY HEAVY DIVISION Fiber Optic Guided Missile

NLOS-CA COMPANY LIGHT DIVISION Fiber Optic Guided Missile

NLOS-CA COMPANY HEAVY DIVISION 120mm Mortar

NLOS-CA COMPANY LIGHT DIVISION 120mm Mortar

(All systems to be mounted/transported on HMMWV except the 120mm mortar heavy division, which is mounted on a M1064 Mortar Carrier (M113 Series Tracked vehicle.) The manpower requirements for the IDS and IGS maintenance units and assess the impact of each of the alternative on the Army. Since there is no predecessor system the entire manpower and equipment requirements for the NLOS-CA Company will be an increased burden upon the Army's resource pool.

3.1.1 Scope. Provide manpower and personnel requirements estimates for the operation and maintenance of a Brigade level NLOS-CA Company, and for the supporting IDS and IGS Companies.

3.1.2 Objective. The objective of the NLOS-CA Manpower and Personnel Requirements Analysis was to identify, using the best available data, the manpower requirements by (MOS) and grade for each of the two alternatives, requested by the COEA Study, and the supporting IDS maintenance company. The manpower and personnel analysis addressed the system specific and all support military manpower requirements by grade and MOS for the alternatives described above. This analysis included verification of system specific operator and maintainer MOSs. The sources of information for determining the MOSs impacted by this MP analysis included the NLOS-CA SMMP, and other documents listed in Appendix B, and AR 611-201, Enlisted Career Management Fields and Military Occupational Specialties. The next step was to apply the BOIPs to the appropriate TOEs to determine the identity and density of all TOE equipment requirements, and to determine the appropriate operator/maintainer identities (i.e., MOS) for each of the alternatives. Once the equipment requirements were identified for each of the alternatives, the Annual Maintenance Man-Hours (AMMHs) were determined by MOS and by maintenance level for each item of equipment. This data was then loaded into the MRD Model to be used in the calculation of manpower requirements.

Organizational fuel and ammunition transport vehicle operator requirements were determined by application of the daily fuel consumption rates (e.g., gallons per hour, kilometers per gallon, etc.) by type fuel (e.g., diesel, gasoline), daily ammunition consumption rates, daily tonnage, and vehicle capacity (bulk out or weight out). The maintainer manpower requirements were then calculated for each item of equipment using the standard Army manpower determination algorithms and the revised Manpower Requirements Criteria (MARC) MOS Availability Factors contained in AR 570-2 dated 15 May 1992. SGAs from AR 611-201 for each MOS addressed were loaded into the MRD model and the distribution of manpower by grade for each MOS was calculated. The MRD model reports depict the

manpower requirements by MOS and grade, by component for each of the alternatives, the IDS and the IGS unit.

**3.1.3 Manpower Analysis Assumptions and Constraints.** The following assumptions and constraints were applied to the manpower and personnel analysis:

- NLOS-CA specific equipment was designed for a Two-Level Maintenance Concept. All other unit equipment was anticipated to be operated under the current U.S. Army maintenance concept.
- LRSM maintenance support concept is the standard four level maintenance system.
- BIT/BITE for NLOS-CA systems is planned to be 80% accurate, 95% of the time.
- Supply operations will continue under the current three-level concept.
- Manpower requirements were calculated for a wartime 100% manning level.

**3.1.4 Personnel Assumptions and Constraints.**

- For the purposes of this study, the NLOS-CA Operator MOS was designated as MOS 11C for LRSM and 11H for FOG-M.
- 11C and 11H MOS Target Audience Description were used for NLOS-CA LRSM and FOG-M physical and mental attributes.
- The quality and skill of the target audience will not increase over that of the 11C and 11H MOS.
- Manpower requirements will be supported consistent with current authorizations and operating strength levels of support.

**3.1.5 MP Planning Factors Database.** This database contains the information necessary to conduct the MPA and LIA requirements analysis. Most of the input data were in hard copy format. The necessary data elements had to be manually entered into the Manpower and Personnel databases by the analysts.

**3.2 FINDINGS.** The manpower and personnel requirements reports for each of the alternatives provide Qualitative and Quantitative MOS and Grade level of detail, listings of equipment quantities in Line Item Number (LIN) sequence, and a display of the applicable operator MOS in each organizational functional area.

3.2.1 System Manpower Requirements (See Tables H-1 through H-16 in Appendix H). The results for each alternative are displayed in recapitulation format with appropriate header information:

#### UNIT MANPOWER REQUIREMENTS

| MOS | DTOE    | PROJECTED | DELTA | NLOS CO | GRADE |
|-----|---------|-----------|-------|---------|-------|
|     | NLOS CO | NLOS CO   |       |         |       |

-----  
EQUIPMENT SECTION

NLOS CO \_\_\_\_\_

LIN NOMENCLATURE

NEW REQ

3.2.2 Base Case - Zero. The manpower requirements identified for the Base Case system were nonexistent since the base case is zero. This situation indicates that there are no "bill payers" available to fund manpower requirements for either of the alternatives.

3.2.3 NLOS-CA FOG-M Heavy Division Manpower Results (see Table 3-1). The NLOS-CA Company (FOG-M) Heavy Division system operator/crewmember were determined by the Army to be two (2) per system. Maintainer manpower requirements for system specific and supporting items of equipment were calculated using the maintenance ratios or AMMHs provided by the NLOS-CA PMO or extracted from the Army MARC Maintenance Database (AMMDB).

TABLE 3-1

#### NLOS-CA FOG-M HEAVY DIVISION MANPOWER RESULTS (Distribution of 11H Heavy Antiarmor Weapons Infantrymen)

| PARA NO. | FUNCTIONAL AREA | E-8     | E-7 | E-6      | E-5 | E-4   | E-3 | TOTAL |
|----------|-----------------|---------|-----|----------|-----|-------|-----|-------|
| 101      | HQ SECTION      | 1       | 1   | 1        |     | 2     |     | 5     |
| 104      | PLAT HQ         |         | 3   |          |     |       | 9   | 12    |
| 105      | NLOS SECTION    |         |     | 6        | 6   | 12    |     | 24    |
|          | TOTAL           | 1       | 4   | 7        | 6   | 14    | 9   | 41    |
| OFFICER  |                 | WARRANT |     | ENLISTED |     | TOTAL |     |       |
| 5        |                 | 0       |     | 56       |     | 61    |     |       |

3.2.4 NLOS-CA FOG-M Light Division Manpower Results (see Table 3-2). The NLOS-CA Company (FOG-M) Light Division system operator/crewmember were determined by the Army to be two (2) per system. Maintainer manpower requirements for system specific and supporting items of equipment were calculated using the maintenance ratios or AMMHs provided by the NLOS-CA PMO or extracted from the AMMDB.

TABLE 3-2

**NLOS-CA FOG-M LIGHT DIVISION MANPOWER RESULTS**  
**(Distribution of 11H Heavy Antiarmor Weapons Infantrymen)**

| PARA NO.       | FUNCTIONAL AREA | E-8            | E-7      | E-6             | E-5      | E-4          | E-3      | TOTAL     |
|----------------|-----------------|----------------|----------|-----------------|----------|--------------|----------|-----------|
| 101            | HQ SECTION      | 1              | 1        | 1               |          | 2            |          | 5         |
| 104            | PLAT HQ         |                | 3        |                 |          |              | 9        | 12        |
| 105            | NLOS SECTION    |                |          | 6               | 6        | 12           |          | 24        |
|                | <b>TOTAL</b>    | <b>1</b>       | <b>4</b> | <b>7</b>        | <b>6</b> | <b>14</b>    | <b>9</b> | <b>41</b> |
| <b>OFFICER</b> |                 | <b>WARRANT</b> |          | <b>ENLISTED</b> |          | <b>TOTAL</b> |          |           |
| <b>5</b>       |                 | <b>0</b>       |          | <b>55</b>       |          | <b>60</b>    |          |           |

3.2.5 LRSM Heavy Division Manpower Results (see Table 3-3). The manpower requirements for the LRSM Heavy Division system operator/crewmember were determined by the Army to be five (5) per system. Maintainer manpower requirements for system specific and supporting items of equipment were calculated using the maintenance ratios or AMMHs provided by the NLOS-CA PMO or extracted from the AMMDB.

TABLE 3-3

**LRSM HEAVY DIVISION MANPOWER RESULTS**  
**(Distribution of 11C Indirect Fire Infantrymen)**

| PARA NO.       | FUNCTIONAL AREA | E-8            | E-7      | E-6             | E-5       | E-4          | E-3       | TOTAL     |
|----------------|-----------------|----------------|----------|-----------------|-----------|--------------|-----------|-----------|
| 101            | HQ SECTION      | 1              |          |                 |           |              | 2         | 3         |
| 103            | PLAT HQ         | 2              |          |                 |           |              | 2         | 4         |
| 104            | MORTAR SECTION  |                | 4        | 4               | 4         |              | 4         | 16        |
| 105            | MORTAR SQUAD    |                |          |                 | 12        | 24           | 24        | 60        |
|                | <b>TOTAL</b>    | <b>3</b>       | <b>4</b> | <b>4</b>        | <b>16</b> | <b>24</b>    | <b>32</b> | <b>83</b> |
| <b>OFFICER</b> |                 | <b>WARRANT</b> |          | <b>ENLISTED</b> |           | <b>TOTAL</b> |           |           |
| <b>5</b>       |                 | <b>0</b>       |          | <b>107</b>      |           | <b>112</b>   |           |           |

3.2.6 LRSM Light Division Manpower Results (see Table 3-4). The manpower requirements for the LRSM Light Division system operator/crewmember were determined by the army to be five (5) per system. Maintainer manpower requirements for system specific and supporting items of equipment were calculated using the maintenance ratios or AMMHs provided by the NLOS-CA PMO or extracted from the AMMDB.

TABLE 3-4

**LRSN LIGHT DIVISION MANPOWER RESULTS**  
**(Distribution of 11C Indirect Fire Infantrymen)**

| PARA NO.       | FUNCTIONAL AREA | E-8            | E-7      | E-6             | E-5       | E-4          | E-3       | TOTAL     |
|----------------|-----------------|----------------|----------|-----------------|-----------|--------------|-----------|-----------|
| 101            | HQ SECTION      | 1              |          |                 |           |              | 2         | 3         |
| 103            | PLAT HQ         | 2              |          |                 |           |              | 2         | 4         |
| 104            | MORTAR SECTION  |                | 4        | 4               | 4         |              | 4         | 16        |
| 105            | MORTAR SQUAD    |                |          |                 | 12        | 24           | 24        | 60        |
|                | <b>TOTAL</b>    | <b>3</b>       | <b>4</b> | <b>4</b>        | <b>16</b> | <b>24</b>    | <b>32</b> | <b>83</b> |
| <b>OFFICER</b> |                 | <b>WARRANT</b> |          | <b>ENLISTED</b> |           | <b>TOTAL</b> |           |           |
| 5              |                 | 0              |          | 99              |           | 104          |           |           |

**3.2.7 Intermediate Direct Support (IDS) and Intermediate General Support (IGS) Maintenance Manpower.** The format for the IDS analysis differs from that of the NLOS-CA CO. Columns A and B display only the MOSC and the fractional manpower requirements for the system specific and supporting equipment items. This demand would be added to the existing demands of the supporting units. See Table H-14 in Appendix H for IDS and IGS manpower results.

**NON-LINE OF SIGHT - COMBINED ARMS (NLOS-CA)  
MANPOWER, PERSONNEL AND LOGISTICS IMPACT ANALYSES (LIA)**

**APPENDIX A  
LIST OF ACRONYMS**

|                |  |
|----------------|--|
| AAMP           | Annual Available MOS Productive Man-Hours        |
| ADDS           | Army Digital Data System                         |
| AHP            | Analytical Hierarchy Process                     |
| AMMH           | Annual Maintenance Man Hours                     |
| AEPCO          | Advanced Engineering and Planning Corp.          |
| AOE            | Army of Excellence                               |
| APGMM          | Advanced Precision Guided Mortar Munitions       |
| ASARC          | Army Systems Acquisition Review Council          |
| ARDEC          | Army Research Development and Engineering Center |
| ASVAB          | Armed Services Vocational Aptitude Battery       |
| ASI            | Additional Skill Identifier                      |
| ATE            | Automatic Test Equipment                         |
| A <sub>o</sub> | Operational Availability                         |
|                |  |
| BCE            | Baseline Cost Estimate                           |
| BCS            | Baseline Comparison System                       |
| BFA            | Battlefield Functional Area                      |
| BIT/BITE       | Built-in Test/Built-in Test Equipment            |
| BMS            | Battalion Mortar System                          |
| BOIP           | Basis of Issue Plan                              |
| BRU            | Battery Replaceable Unit                         |
| BSTF           | Base Shop Test Facility                          |
|                |  |
| CARD           | Cost Analysis Requirements Document              |
| C <sup>2</sup> | Command and Control                              |
| CDR            | Critical Design Review                           |
| CHS            | Common Hardware and Software                     |
| CLS            | Contractor Logistic Support                      |
| COEA           | Cost and Operational Effectiveness Analysis      |
| CSS            | Combat Service Support                           |
| CTS            | Contact Test Set                                 |
|                |  |
| DA             | Department of the Army                           |
| DCD            | Directorate of Combat Developments               |
| DEM/VAL        | Demonstration and Validation                     |
| DNAW           | Day/Night and Adverse Weather                    |
| DoD            | Department of Defense                            |
| DPAMMH         | Direct Productive Annual Maintenance Man Hours   |
| DRC            | Dynamics Research Corporation                    |
| DS             | Direct Support                                   |
|                |  |
| EMD            | Engineering and Manufacturing Development        |
| EOD            | Explosive Ordnance Disposal                      |

|                    |   |
|--------------------|---|
| FO . . . . .       | Force Operations                                  |
| FOG-M . . . . .    | Fiber Optic Guided Missile                        |
| FSD . . . . .      | Full Scale Development                            |
| FU . . . . .       | Fire Unit   |
| FY . . . . .       | Fiscal Year                                       |
|                    |   |
| GC . . . . .       | Gunner's Console                                  |
| GFE . . . . .      | Government Furnished Equipment                    |
| GFI . . . . .      | Government Furnished Information                  |
| GS . . . . .       | General Support                                   |
|                    |   |
| HARDMAN . . . . .  | Hardware versus Manpower                          |
| HCM . . . . .      | HARDMAN Comparative Methodology                   |
| HMMWV . . . . .    | High Mobility Multipurpose Wheeled Vehicle        |
| HSI . . . . .      | Human Systems Integration                         |
| HHV . . . . .      | Heavy Version, HMMWV                              |
|                    |   |
| IFTE . . . . .     | Integrated Family of Test Equipment               |
| IDS . . . . .      | Intermediate Direct Support                       |
| ILS . . . . .      | Integrated Logistic Support                       |
| ILSP . . . . .     | Integrated Logistic Support Plan                  |
|                    |   |
| LIA . . . . .      | Logisitics Impact Analysis                        |
| LNS . . . . .      | Land Navigation System                            |
| L/SC . . . . .     | Launch/Storage Container                          |
| LRIP . . . . .     | Low Rate Initial Production                       |
| LRSM . . . . .     | Long Range Smart Mortar                           |
| LRU . . . . .      | Line Replaceable Unit                             |
| LSA . . . . .      | Logistics Support Analysis                        |
| LSAR . . . . .     | Logistics Support Analysis Record                 |
|                    |   |
| MAC . . . . .      | Maintenance Allocation Chart                      |
| MANPRINT . . . . . | Manpower and Personnel Integration                |
| MARC . . . . .     | Manpower Requirements Criteria                    |
| MATDEV . . . . .   | Materiel Developer                                |
| MDR . . . . .      | Milestone Decision Review                         |
| MER . . . . .      | Manpower Estimate Report                          |
| MOE . . . . .      | Measure of Effectiveness                          |
| MOP . . . . .      | Measure of Performance                            |
| MOPP . . . . .     | Mission Oriented Protective Posture               |
| MOS . . . . .      | Military Occupational Specialty                   |
| MPA . . . . .      | Manpower and Personnel Analysis                   |
| MPT . . . . .      | Manpower, Personnel, and Training                 |
| MR . . . . .       | Maintenance Ratio                                 |
| MRD . . . . .      | Manpower Requirements Determination               |
| MTBF . . . . .     | Mean Time Between Failure                         |
| MTBOMF . . . . .   | Mean Time Between Operational Mission Failure     |
| MTBUMA . . . . .   | Mean Time Between Unscheduled Maintenance Actions |
| MTOE . . . . .     | Modified Table of Organization and Equipment      |
| MTTR . . . . .     | Mean Time to Repair                               |
|                    |   |
| NBC . . . . .      | Nuclear, Biological, and Chemical                 |

NETP . . . . . New Equipment Training Plan

OMS . . . . . Operator, Maintainer, Support

OMS/MP . . . . . Operational Mode Summary/Mission Profile

O&M . . . . . Operator and Maintainer

O&O . . . . . Operational and Organizational

ORD . . . . . Operational Requirements Document

OVE . . . . . On Vehicle Equipment

PHS . . . . . Packaging, Handling and Storage

PLL . . . . . Prescribed Load List

PLS . . . . . Palletized Load System

PM . . . . . Program Manager

PMCS . . . . . Preventive Maintenance Checks and Services

PMO . . . . . Project Manager's Office

PTL . . . . . Primary Target Lines

QQPRI . . . . . Qualitative and Quantitative Personnel Requirements  
Information

RAM . . . . . Reliability, Availability, and Maintainability

RDEC . . . . . Research, Development and Engineering Center

RRR . . . . . RAM Rationale Report

SGA . . . . . Standard of Grade Authorizations

SINCGARS . . . . . Single Channel Ground and Airborne Radio System

SME . . . . . Subject Matter Expert

SMMP . . . . . System MANPRINT Management Plan

SRC . . . . . Standard Requirements Code

SRU . . . . . Shop Repairable Unit

STRAP . . . . . System Training Plan

TAD . . . . . Target Audience Description

TDA . . . . . Table of Distribution and Allowances

TMDE . . . . . Test, Measurement and Diagnostic Equipment

TOC . . . . . Tactical Operations Center

TOE . . . . . Table of Organization and Equipment

TPS . . . . . Test Program Set

TRAC . . . . . TRADOC Analysis Center

TRADOC . . . . . Training and Doctrine Command

USAADASCH . . . . . United States Army Air Defense Artillery Center and School

USAIS . . . . . United States Army Infantry School

USAMICOM . . . . . United States Army Missile Command

USAMSAA . . . . . United States Army Materiel Systems Analysis Activity

USAOC&S . . . . . United States Army Ordnance Center and School

USAOMMCS . . . . . United States Army Ordnance, Missile, and Munitions Center  
and School

URS . . . . . Unit Reference Sheet

WS . . . . . Weapon System

WSMR . . . . . White Sands Missile Range, New Mexico

**NON-LINE OF SIGHT - COMBINED ARMS (NLOS-CA)  
MANPOWER, PERSONNEL AND LOGISTICS IMPACT ANALYSES (LIA)**

**APPENDIX B  
REFERENCES**

The following documents, reports, and training publications have been reviewed and used as references as part of the NLOS-CA MPA and LIA:

- Operational Mode Summary/Mission Profile for NLOS-CA, 7 February 1992, U.S. Army Infantry School (USAIS), Fort Benning, Georgia (SECRET)
- Operational Requirements Document (ORD) for NLOS-CA System, 11 June 1993, USAIS, Directorate of Combat Developments (DCD), Fort Benning, Georgia (Secret)
- NLOS-CA System Specification, 22 June 1993, NLOS-CA PMO, Huntsville, Alabama (Secret)
- Draft NLOS-CA System MANPRINT Management Plan (SMMP), 9 June 1993, USAIS-DCD, Fort Benning, Georgia
- NLOS-CA System Training Plan (STRAP), 6 May 1993, USAIS, Directorate of Training Development (DOTD), Fort Benning, Georgia
- NLOS-CA Qualitative and Quantitative Personnel Requirements Information (QQPRI), 19 March 1993, NLOS-CA Project Manager's Office (PMO), Huntsville, Alabama
- NLOS-CA Table of Organization and Equipment (TOE), 31 July 1993, USAIS-DCD, Fort Benning, Georgia
- NLOS-CA , Operational and Organizational Plan, 16 August 1991, NLOS-CA PMO, Huntsville, Alabama
- NLOS-CA Test and Evaluation Master Plan, 17 June 1993, NLOS-CA PMO, Huntsville, Alabama
- Draft NLOS-CA Integrated Logistics Support Plan, July 1993, NLOS-CA PMO, Huntsville, Alabama

- Non-Line of Sight (NLOS) Air Defense/Anti-Tank (AD/AT) HARDMAN Study, February 1990, Hay Systems Inc., Washington, DC.
- Final Draft Material Fielding Plan for M120 120mm Towed Mortar, January 1991, U.S. Army Armament, Munitions, and Chemical Command, Rock Island Arsenal, Illinois
- Final Draft, Integrated Logistic Support Plan for the 120MM Mortar Enhanced Ammunition, 25 February 1991, U.S. Army Armament, Munitions and Chemical Command, Picatinny Arsenal, NJ
- Non-Line of Sight-Combined Arms (NLOS-CA) Manpower Estimate Report (MER), October 1993, NLOS-CA Project Management Office, AMSMI-NL, Redstone Arsenal, Alabama 35898-5793

**NON-LINE OF SIGHT - COMBINED ARMS (NLOS-CA)  
MANPOWER, PERSONNEL AND LOGISTICS IMPACT ANALYSES (LIA)**

**APPENDIX C  
MISSION PROFILE ANALYSIS**

**C-1 General:** The operating metrics system operating miles, system operating hours, and rounds fired are basic inputs to the calculation of several Measures of Performance (MOP) used in the Logistics Impact Analysis of the NLOS-CA and LRSM weapon systems. This describes the methodology used to derive those values.

**C-2 Reference:** NLOS-CA Operational Requirements Document, Annex B, dated 11 June 1993, Unclassified data only was the source document for this analysis. The LRSM is a notional system at the time of this analysis and no Operational Mode Summary/Mission Profile is available. Therefore, in accordance with guidance provided by PM Mortar through the COEA Study Team, the NLOS-CA Mission Profile was applied to the LRSM.

**C-3 Methodology:** Task times and number of occurrences were extracted from Mission Profiles tables in the OMS/MP. Mission Tasks were allocated to the appropriate operating metrics and totalled to calculate the following variables:

- a. Travel - miles and hours on chassis.
- b. Weapon system operational time - operating time on weapon system.
- c. Assume radios operate during entire operational period (travel, ready, alert and operational).
- d. "Number of occurrences" of the "Fire Missile" task equals rounds fired.

When necessary, raw data extracted from the Mission Profile was converted to the appropriate measure, i.e kilometers per hour to miles per hour.

**C-4 Assumptions and Constraints:**

- a. The 96 hour combat scenario described in the OMS/MPG is appropriate and applicable.
- b. Valid daily rates can be obtained by dividing scenario rates by four.

c. The mission profile of the LRSM is identical to the NLOS-CA.

**C-5 Analysis:**

a. General: The Operational Mode Summary/Mission Profile describes how a weapon will be employed during performance of its mission. The Mission Profile is a time-phased description of the operational events and environments a weapon system experiences from beginning to end of a specific mission. It identifies tasks, events, durations, operating conditions and environment of the system for each phase of a given mission.

Five missions are described for the NLOS-CA:

- (1) Covering Force.
- (2) Main Battle Area (MBA) Defense
- (3) Attack
- (4) Counterattack
- (5) Reserve

Heavy units perform all missions. Light units are assigned only MBA defense, attack, and reserve missions.

b. Operating Hours- NLOS-CA: The NLOS Mission Profile is measured in operating hours. Relevant data is summarized in Table C-1 for both heavy and light units.

Time segment used in the analysis are summarized as follows:

(1) Travel Time is that Segment of Ready Operational Time, designated Ready-Travel in the MP, during which the system is moving between locations. Emplacement time is included in travel time for this analysis.

(2) Weapon Operating Time is that portion of Ready Operational Time, designated Weapon System Operational Time, during which the weapon system is powered up.

(3) Alert Time is that time during which radios are operating, but the system is not powered up. For this analysis, Alert Time is the sum of Ready Alert and non-Ready Operational Alert Time segments.

Note that total time does not add up to 96 hours. System down time is not calculated.

TABLE C-1

**MISSION PROFILE OPERATING HOURS PER NLOS-CA FIRING UNIT  
96 HOUR SCENARIO**

| <b>HEAVY BRIGADE NLOS SUMMARY</b>  |                    |                    |                   |
|--|--------------------|--------------------|-------------------|
| <b>MISSION</b>   | <b>TRAVEL TIME</b> | <b>WPN OP TIME</b> | <b>ALERT TIME</b> |
| <b>COVER FORCE</b>   | 3.5                | 4.5                | 12.1              |
| <b>MBA DEFENSE</b>   | 9.1                | 6.4                | 7.2               |
| <b>ATTACK</b>  | 1.6                | 1.5                | 20.2              |
| <b>COUNTERATTACK</b>   | 4.4                | 2.4                | 5.2               |
| <b>RESERVE</b>   | .8                 | 0                  | 8.5               |
| <b>T O T A L</b>   | 19.4               | 14.8               | 53.2              |
| <b>LIGHT BRIGADE NLOS SUMMARY</b>  |                    |                    |                   |
| <b>MISSION</b>   | <b>TRAVEL TIME</b> | <b>WPN OP TIME</b> | <b>ALERT TIME</b> |
| <b>MBA DEFENSE</b>   | 4.7                | 6.6                | 60.9              |
| <b>ATTACK</b>  | 1.1                | .8                 | 1.2               |
| <b>RESERVE</b>   | .8                 | 0                  | 1.1               |
| <b>T O T A L</b>   | 6.6                | 7.4                | 63.2              |
| <b>NOTES:</b> 1. Travel Time includes emplacement time<br>2. Alert Time = Ready Alert + Alert Time (AT)<br>3. All times in hours |                    |                    |                   |
| <b>SOURCE:</b> NLOS-CA ORD, OMS/MPG, dated 11 June 1993, unclassified data only. Tables A-4 through A-12.                        |                    |                    |                   |

c. Operating Miles: Miles travelled is calculated by determining the time spent traveling in each terrain type and converting to miles using average speed.

The number and duration of trips by primary roads, secondary roads and cross country was extracted from the Mission Profile to obtain total travel time per terrain. Average speed per terrain was extracted from Table A-2, page B-2 in Kilometers per hour (KPH):

Travel time \* kph= kilometers

Kilometers travelled was then converted to miles by multiplying by .6214.

Miles travelled in each terrain type by mission were summed to obtain total miles travelled.

A summary of operating miles per scenario is displayed in Table C-2.

**TABLE C-2**

**MISSION PROFILE OPERATING MILES PER NLOS-CA FIRING UNIT  
96 HOUR SCENARIO**

| <b>HEAVY BRIGADE NLOS SUMMARY</b>  |                |                  |                      |              |
|--|----------------|------------------|----------------------|--------------|
| <b>MISSION</b>   | <b>PRIMARY</b> | <b>SECONDARY</b> | <b>CROSS COUNTRY</b> | <b>TOTAL</b> |
| <b>COVER FORCE</b>   | 4.66           | 2.80             | 13.26                | 20.71        |
| <b>MBA DEFENSE</b>   | 10.36          | 68.35            | 28.34                | 107.05       |
| <b>ATTACK</b>  | 0.00           | 7.46             | 5.80                 | 13.26        |
| <b>COUNTERATTACK</b>   | 0.00           | 37.38            | 14.42                | 51.70        |
| <b>RESERVE</b>   | 0.00           | 11.19            | 0.83                 | 12.01        |
| <b>T O T A L</b>   | 15.02          | 127.08           | 62.64                | 204.73       |
| <b>LIGHT BRIGADE NLOS SUMMARY</b>  |                |                  |                      |              |
| <b>MISSION</b>   | <b>PRIMARY</b> | <b>SECONDARY</b> | <b>CROSS COUNTRY</b> | <b>TOTAL</b> |
| <b>MBA DEFENSE</b>   | 10.36          | 68.35            | 28.34                | 107.05       |
| <b>ATTACK</b>  | 0.00           | 7.46             | 5.80                 | 13.26        |
| <b>RESERVE</b>   | 0.00           | 11.19            | 0.83                 | 12.01        |
| <b>T O T A L</b>   | 15.02          | 127.08           | 62.64                | 204.73       |
| <b>SOURCE: NLOS-CA ORD, OMS/MPG, dated 11 June 1993, unclassified data only. Tables A-2, A-4 through A-12.</b> |                |                  |                      |              |

d. **Rounds Fired:** The number of missiles fired per mission per 96 hour scenario are provided in Mission Profile Tables. NLOS-CA "Missiles Fired" are converted to LRSM rounds fired using a factor based on Pk(e).

$$Pk(e)NLOS-CA = P(\text{launch}) * P(\text{kill}) = .9 * .9 = .8$$

Assume Pk(e) LRSM round = .4 based on guidance from USAIS and COEA team.

$$\text{Conversion factor} = .8 / .4 = 2$$

A summary of NLOS missiles and LRSM rounds fired is displayed in Table C-3. A summary of Mission Profile/Operating Metric results is displayed in Table C-4.

TABLE C-3

**MISSION PROFILE ROUNDS FIRED PER NLOS-CA AND LRSM FIRING UNIT  
96 HOUR SCENARIO**

| <b>HEAVY BRIGADE NLOS SUMMARY</b>   |                       |                    |                       |
|---|-----------------------|--------------------|-----------------------|
| <b>MISSION</b>  | <b>NLOS LAUNCHERS</b> | <b>CONV FACTOR</b> | <b>EQUIV LRSM RND</b> |
| <b>COVER FORCE</b>  | 12                    | 2                  | 24                    |
| <b>MBA DEFENSE</b>  | 30                    | 2                  | 60                    |
| <b>ATTACK</b>   | 7                     | 2                  | 14                    |
| <b>COUNTERATTACK</b>  | 10                    | 2                  | 20                    |
| <b>RESERVE</b>  | 0                     | 2                  | 0                     |
| <b>T O T A L</b>  | 59                    | 2                  | 118                   |
| <b>LIGHT BRIGADE NLOS SUMMARY</b>   |                       |                    |                       |
| <b>MISSION</b>  | <b>NLOS LAUNCHERS</b> | <b>CONV FACTOR</b> | <b>EQUIV LRSM RND</b> |
| <b>MBA DEFENSE</b>  | 18                    | 2                  | 36                    |
| <b>ATTACK</b>   | 7                     | 2                  | 14                    |
| <b>RESERVE</b>  | 0                     | 2                  | 0                     |
| <b>T O T A L</b>  | 25                    | 2                  | 50                    |
| <b>SOURCE: NLOS-CA ORD, OMS/MPG, dated 11 June 1993, unclassified data only. Tables A-4 through A-12.</b> |                       |                    |                       |

TABLE C-4

**OPERATING METRIC SUMMARY PER WEAPON SYSTEM  
96 HOUR SCENARIO**

|                          | <b>H E A V Y</b> |             | <b>L I G H T</b> |             |
|--------------------------|------------------|-------------|------------------|-------------|
|                          | <b>NLOS</b>      | <b>LRSM</b> | <b>NLOS</b>      | <b>LRSM</b> |
| <b>TRAVEL TIME (HRS)</b> | 19.4             | N/A         | 6.6              | N/A         |
| <b>OPERATING MILES</b>   | 204.73           | 204.73      | 60.71            | 60.71       |
| <b>WPN OP TIME (HRS)</b> | 14.8             | 14.8        | 7.4              | 7.4         |
| <b>ALERT TIME</b>        | 53.2             | 53.2        | 63.2             | 63.2        |
| <b>ROUNDS FIRED</b>      | 59               | 118         | 25               | 50          |

**NON-LINE OF SIGHT - COMBINED ARMS (NLOS-CA)  
MANPOWER, PERSONNEL AND LOGISTICS IMPACT ANALYSES (LIA)**

**APPENDIX D  
FUEL CONSUMPTION ANALYSIS**

**D-1 General.** Fuel consumption is a function of fuel consumption rates and miles driven for each system.

**D-2 References.** A complete set of fuel consumption rates for equipment included in this study was not available from the U.S. Army Petroleum Center. Fuel Consumption Rates were obtained from FM 10-13, Supply and Service Reference Data. The Methodology for this analysis was obtained from FM 101-10-1, Staff Officer's Field Manual; Organizational, Technical and Logistic Data.

**D-3 Methodology.** Usage rates (mileage) were derived for each weapon system from an analysis of the OMS/MP (see Appendix C, Mission Profile Analysis to this report). Mileage is the sum of road miles, cross country, miles and service miles.

- Road miles are travel on primary and secondary roads. Fuel consumption in this environment is at the rated value.
- Cross country miles are travelled off-road in rugged terrain. Fuel consumption in cross country environments is 1.5 times the average rate.
- Service usage represent vehicle operation for warm-up, administration, reconnaissance and movement within the bivouac area. Service fuel consumption is estimated as equal to fuel required to move all vehicles the equivalent of 16 road kilometers.

Daily consumption per vehicle was multiplied by vehicle quantities per unit to obtain gallons per day consumption per unit. A wastage factor of 10% of the total usage was added to obtain total fuel consumption per unit.

Due to differences in Mission Profile for Light and Heavy scenarios, fuel consumption was calculated for equipment in both scenarios. Equipment lines were extracted to create aggregate unit values provided in the report.

**D-4 Assumptions and Constraints.**

- All equipment uses diesel fuel.

**D-5 Analysis.**

Fuel Consumption calculations are summarized in Tables D-1 through D-5.

TABLE D-1

## HEAVY SCENARIO FUEL (DIESEL) CONSUMPTION CALCULATIONS SUMMARY

|                          | ROAD<br>MFD | X CNTRY<br>MFD | SERVICE<br>MFD | GAL PER<br>MILE | GPD PER<br>VEHICLE | WASTAGE | TOT GPD<br>PER VEH |
|--------------------------|-------------|----------------|----------------|-----------------|--------------------|---------|--------------------|
| C10990 CARRIER, 120mm    | 35.58       | 15.6           | 9.94           | 0.40            | 27.68              | 2.77    | 30.45              |
| C18234 CARRIER, FULL TR  | 35.58       | 15.6           | 9.94           | 0.40            | 27.68              | 2.77    | 30.45              |
| D11538 CARRIER, CMD PO   | 35.58       | 15.6           | 9.94           | 0.40            | 27.68              | 2.77    | 30.45              |
| G11966 GEN SET SKW       | 24          | ---            | ---            | 1.40            | 33.60              | 3.36    | 36.96              |
| G18358 GEN 3KW SKID      | 24          | ---            | ---            | 1.40            | 33.60              | 3.36    | 36.96              |
| T39518 TRK, CGO, 8X8 HEM | 66.48       | 26.59          | 9.94           | 0.20            | 23.59              | 2.36    | 25.95              |
| T61494 TRK, UTIL HMMWV   | 35.58       | 15.6           | 9.94           | 0.09            | 6.20               | 0.62    | 6.82               |
| T63083 TRK, WRK, 8x8     | 66.48       | 26.59          | 9.94           | 0.20            | 23.59              | 2.36    | 25.95              |
| T87243 TRK, FL 2500 GAL  | 66.48       | 26.59          | 9.94           | 0.20            | 23.59              | 2.36    | 25.95              |
| T92242 TRK, UTIL HMMWV   | 35.58       | 15.6           | 9.94           | 0.09            | 6.20               | 0.62    | 6.82               |
| Z28175 FOG-M SYSTEM      | 35.58       | 15.6           | 9.94           | 0.09            | 6.20               | 0.62    | 6.82               |
| Z40430 TRK, CGO LMTV     | 35.58       | 15.6           | 9.94           | 0.09            | 6.20               | 0.62    | 6.82               |
| Z62381 RECOV M88A1E1     | 35.58       | 15.6           | 9.94           | 0.68            | 45.57              | 4.66    | 51.22              |
| Z94097 TRK, TNK POL MTV  | 66.48       | 26.59          | 9.94           | 0.20            | 23.59              | 2.36    | 25.95              |
| Z94433 TRK, WRKR MTV     | 66.48       | 26.59          | 9.94           | 0.20            | 23.59              | 2.36    | 25.95              |

**TABLE D-2**

**LIGHT SCENARIO FUEL CONSUMPTION CALCULATIONS SUMMARY**

| NOMENCLATURE             | ROAD<br>MPD | X CNTRY<br>MPD | SERVICE<br>MPD | GAL PER<br>MILE | GPD PER<br>VEHICLE | WASTAGE | TOT GPD<br>PER VEH |
|--------------------------|-------------|----------------|----------------|-----------------|--------------------|---------|--------------------|
| G18358 GEN 3KW SKID      | 24          | ...            | ...            | 1.40            | 33.60              | 3.36    | 36.96              |
| T07679 TRK, UTIL HHV     | 19.12       | 7.65           | 9.94           | 0.20            | 8.22               | 0.82    | 9.04               |
| T39518 TRK, CGO, 8X8 HEM | 19.12       | 7.65           | 9.94           | 0.20            | 8.22               | 0.82    | 9.04               |
| T61494 TRK, UTIL HMMWV   | 19.12       | 7.65           | 9.94           | 0.09            | 3.65               | 0.36    | 4.01               |
| T63093 TRK, WRKR 8X8     | 19.12       | 7.65           | 9.94           | 0.20            | 8.22               | 0.82    | 9.04               |
| T87243 TRK, FL 2500 GAL  | 8.46        | 3.58           | 9.94           | 0.20            | 4.92               | 0.49    | 5.42               |
| Z94097 TRK, TNK POL MTV  | 19.12       | 7.65           | 9.94           | 0.20            | 8.22               | 0.82    | 9.04               |
| Z40430 TRK, CGO LMTV     | 19.12       | 7.65           | 9.94           | 0.09            | 3.65               | 0.36    | 4.01               |
| Z94433 TRK, WRKR MTV     | 19.12       | 7.65           | 9.94           | 0.20            | 8.22               | 0.82    | 9.04               |
| Z94491 TRK, HHV 1097     | 10.47       | 4.19           | 9.94           | 0.20            | 5.34               | 0.53    | 5.87               |
| Z28175 FOG-M SYSTEM      | 10.47       | 4.19           | 9.94           | 0.09            | 2.40               | 0.24    | 2.64               |

TABLE D-3

**FUEL CONSUMPTION SUMMARY BY UNIT  
(GALLONS - DIESEL)**

| N L O S / L R S M    L I G H T |         |                      |                       |
|--------------------------------|---------|----------------------|-----------------------|
| NOMENCLATURE                   | VEH QTY | TOTAL GPD<br>PER VEH | TOTAL GPD<br>PER UNIT |
| G18358    GEN 3KW SK           | 1       | 36.96                | 36.96                 |
| T07679    TRK, UTIL H          | 12      | 9.04                 | 108.48                |
| T39518    TRK, CGO 8X          | 3       | 4.01                 | 12.03                 |
| T61494    TRK, UTIL H          | 5       | 4.01                 | 20.05                 |
| T63093    TRK, WRLR 8          | 1       | 9.04                 | 9.04                  |
| T87243    TRK, FL 250          | 1       | 5.42                 | 5.42                  |
| T40430    TRK, CGO LM          | 1       | 4.01                 | 4.01                  |
| Z94097    TRK, TNK PO          | 1       | 9.04                 | 9.04                  |
| Z94433    TRK, WRKR M          | 1       | 9.04                 | 9.04                  |
| Z28175    FOG-M SYS            | 12      | 2.64                 | 31.68                 |
| <b>TOTAL</b>                   |         |                      | <b>245.75</b>         |

TABLE D-4

**FUEL CONSUMPTION SUMMARY BY UNIT  
(GALLONS - DIESEL)**

| N L O S    H E A V Y  |         |                      |                       |
|-----------------------|---------|----------------------|-----------------------|
| NOMENCLATURE          | VEH QTY | TOTAL GPD<br>PER VEH | TOTAL GPD<br>PER UNIT |
| G18358    GEN 3KW SK  | 1       | 36.96                | 36.96                 |
| T39518    TRK, CGO 8X | 3       | 25.95                | 77.85                 |
| T61494    TRK, UTIL H | 5       | 6.82                 | 34.10                 |
| T63093    TRK, WRLR 8 | 1       | 28.54                | 28.54                 |
| T87243    TRK, FL 250 | 1       | 25.95                | 25.95                 |
| T92242    TRK, UTIL H | 12      | 6.82                 | 81.84                 |
| Z94433    TRK, WRKR M | 1       | 15.38                | 15.38                 |
| Z28175    FOG-M SYS   | 12      | 15.38                | 184.56                |
| <b>TOTAL</b>          |         |                      | <b>485.18</b>         |

TABLE D-5

**FUEL CONSUMPTION SUMMARY BY UNIT  
(GALLONS - DIESEL)**

| <b>L R S M H E A V Y</b> |                |                              |                               |
|--------------------------|----------------|------------------------------|-------------------------------|
| <b>NOMENCLATURE</b>      | <b>VEH QTY</b> | <b>TOTAL GPD<br/>PER VEH</b> | <b>TOTAL GPD<br/>PER UNIT</b> |
| C10990 CARRIER, 12       | 12             | 30.45                        | 365.40                        |
| C18234 CARRIER, FU       | 4              | 30.45                        | 121.80                        |
| D11538 CARRIER, CM       | 1              | 30.45                        | 30.45                         |
| G11966 GEN SET 5K        | 1              | 36.96                        | 36.96                         |
| G18358 GEN 3KW SK        | 1              | 36.96                        | 36.96                         |
| T39518 TRK, CGO 8X       | 3              | 25.95                        | 77.85                         |
| T61494 TRK, UTIL H       | 4              | 6.82                         | 27.28                         |
| T63093 TRK, WRKR 8       | 1              | 25.95                        | 25.95                         |
| T87243 TRK, FL 250       | 1              | 25.95                        | 25.95                         |
| Z62381 RECOV M88A        | 1              | 51.22                        | 51.22                         |
| Z94097 TNK, TNK PO       | 1              | 25.95                        | 25.95                         |
| Z94433 TRK, WRKR M       | 1              | 25.95                        | 25.95                         |
| <b>TOTAL</b>             |                |                              | <b>851.72</b>                 |

**NON-LINE OF SIGHT - COMBINED ARMS (NLOS-CA)  
MANPOWER, PERSONNEL AND LOGISTICS IMPACT ANALYSES (LIA)**

**APPENDIX E  
AMMUNITION CONSUMPTION ANALYSIS**

**E-1 General.** Ammunition consumption was calculated from firing rates documented in the OMS/MP.

**E-2 References.** Firing rates were obtained from NLOS-CA the Operational Requirements Document, Annex B, dated 11 June 1993. The methodology used to extract these rates is detailed in Appendix C, Mission Profile Analysis to this report. Ammunition rates, volumes and shipping configuration data was provided and certified by the NLOS-CA and Mortar Program Management Offices.

**E-3 Methodology.** Ammunition consumption per weapon system per 96 hour scenario was calculated from the NLOS-CA Mission Profile. Consumptions by rounds was converted to pallets by dividing total rounds by rounds per pallet. Fractional pallet quantities were rounded up to the next whole pallet. Weight and volume cube were then calculated from pallet dimensions. Unit quantities were obtained by multiplying consumption per weapon system by weapon system per unit.

**E-4 Analysis.** Pallet dimensions are summarized in Table E-1 for both NLOS-CA and LRSM ammunition.

**TABLE E-1  
AMMUNITION PALLET DIMENSION SUMMARY**

|              | N L O S | L R S M |       |
|--------------|---------|---------|-------|
|              |         | LIGHT   | HEAVY |
| ROUNDS       | 6       | 9       | 9     |
| LENGTH       | 86      | 43      | 43    |
| WIDTH        | 64.5    | 39      | 39    |
| HEIGHT       | 12.75   | 46      | 46    |
| CUFT         | 40.9    | 44.6    | 44.6  |
| TOTAL WEIGHT | 1088.2  | 484     | 484   |

Consumption by weapon system was multiplied by 12 to obtain consumption by Brigade (NLOS Company). Consumption by scenario was divided by 4 to obtain daily consumption quantities. Calculations are summarized in Tables E-2 and E-3 as follows:

**TABLE E-2**

**NLOS AMMUNITION CONSUMPTION SUMMARY**

| <b>N L O S      L I G H T</b> |               |                |            |             |             |
|-------------------------------|---------------|----------------|------------|-------------|-------------|
|                               |               | <b>PALLETS</b> |            |             |             |
|                               | <b>ROUNDS</b> | <b>(a)</b>     | <b>(b)</b> | <b>TONS</b> | <b>CUBE</b> |
| <b>WEAPON SYSTEM</b>          |               |                |            |             |             |
| PER SCENARIO                  | 25            | 4.17           | 5          | 2.73        | 204.50      |
| PER DAY                       | 6.25          | 1.04           | 2          | 1.09        | 81.80       |
| <b>BRIGADE</b>                |               |                |            |             |             |
| PER SCENARIO                  | 300           | 50.00          | 51         | 27.80       | 2085.90     |
| PER DAY                       | 75            | 12.50          | 13         | 7.09        | 531.70      |
| <b>N L O S      H E A V Y</b> |               |                |            |             |             |
|                               |               | <b>PALLETS</b> |            |             |             |
|                               | <b>ROUNDS</b> | <b>(a)</b>     | <b>(b)</b> | <b>TONS</b> | <b>CUBE</b> |
| <b>WEAPON SYSTEM</b>          |               |                |            |             |             |
| PER SCENARIO                  | 59            | 9.83           | 10         | 5.45        | 409.00      |
| PER DAY                       | 14.75         | 2.46           | 3          | 1.64        | 122.7       |
| <b>BRIGADE</b>                |               |                |            |             |             |
| PER SCENARIO                  | 708           | 118.00         | 118        | 64.31       | 4826.2      |
| PER DAY                       | 177           | 29.50          | 30         | 16.35       | 1227        |

TABLE E-3

## LRSM AMMUNITION CONSUMPTION SUMMARY

| L R S M      L I G H T |         |         |     |       |         |
|------------------------|---------|---------|-----|-------|---------|
|                        |         | PALLETS |     |       |         |
|                        | ROUNDS  | (a)     | (b) | TONS  | CUBE    |
| WEAPON SYSTEM          |         |         |     |       |         |
| PER SCENARIO           | 50.00   | 5.56    | 6   | 1.45  | 267.60  |
| PER DAY                | 12.50   | 1.39    | 2   | 0.48  | 89.20   |
| BRIGADE                |         |         |     |       |         |
| PER SCENARIO           | 600.00  | 66.67   | 67  | 16.21 | 2988.20 |
| PER DAY                | 150.00  | 16.67   | 17  | 4.11  | 758.20  |
| L R S M      H E A V Y |         |         |     |       |         |
|                        |         | PALLETS |     |       |         |
|                        | ROUNDS  | (a)     | (b) | TONS  | CUBE    |
| WEAPON SYSTEM          |         |         |     |       |         |
| PER SCENARIO           | 118.00  | 13.11   | 14  | 3.39  | 624.40  |
| PER DAY                | 29.50   | 3.28    | 4   | 0.97  | 178.40  |
| BRIGADE                |         |         |     |       |         |
| PER SCENARIO           | 1416.00 | 157.33  | 158 | 38.24 | 7046.80 |
| PER DAY                | 354.00  | 39.33   | 40  | 9.68  | 1784.00 |

**NON-LINE OF SIGHT - COMBINED ARMS (NLOS-CA)  
MANPOWER, PERSONNEL AND LOGISTICS IMPACT ANALYSES (LIA)**

**APPENDIX F  
RELIABILITY, AVAILABILITY AND MAINTAINABILITY (RAM) ANALYSIS**

**F-1 General.** Reliability, Availability and Maintainability (RAM) values measure the operational readiness and maintenance support required to achieve desired readiness levels. Three categories of RAM parameters were used in this study:

- **Operational Readiness parameters.** Measure the probability a system will be available when needed. Operational Availability ( $A_o$ ) is the measure of merit for this category of RAM variable.
- **Mission Success.** Mission success variables measure the probability that a system will complete a mission. Mean Time Between Operational Mission Failures (MTBOMF) is used to measure this variable.
- **Maintenance Manpower.** Maintenance manpower is a function of the frequency of failure and the average time required to repair a failure. Mean Time Between Unscheduled Maintenance Actions (MTBUMA) and Mean Time To Repair (MTTR) measure these characteristics.

**F-2 References and Data Sources.** RAM data was provided by PM NLOS-CA and PM Mortar. The NLOS-CA System Specification, MIS 46200, dated June 1993 and the RAM Rationale Report Annex to the NLOS-CA Operational Requirements Document (ORD), dated June 1993 were the primary data sources for the NLOS-CA System. Data for the LRSM was provided by PM Mortar and is derived from acquisition and fielding documents for the 120mm Battalion Mortar System. Data was also provided by U.S. Army Tank and Automotive Command (TACOM) for the M1097 HMMWV and M1064 Mortar Carrier. Verbal certification has been provided by PM NLOS-CA and PM Mortar. Informal agreement on data sources was provided by USAMSAA. Formal certification by USAMSAA of data used in the following analysis has been requested but has not been received as of the date of this report. Data used for this analysis is engineering RAM data derived from the sources discussed above. Alternate sources for this data, including sources of operational, test-based RAM data were discussed with PM offices and USAMSAA representatives. No sources of this type were uncovered during the data collection effort. Further, given the notional status of system designs, the COEA Study Director indicated a preference for engineering data. Therefore, this data was judged to be the best

available within the scope of the effort, and was used in the analysis to assure consistency of comparisons.

### **F-3 Assumptions and Constraints.**

#### **a. Assumptions.**

- Engineering RAM values are valid for determining logistics impact.
- 120mm BMS RAM values apply to the notional LRSM.
- Mortar maintenance is negligible.

#### **b. Constraints.**

- The LRSM is a notional system. The level of detail used in the analysis and the degree of accuracy required of the data reflects the status of this alternative.
- Stringent time constraints on the performance of this analysis precluded a more comprehensive search for data.

**F-4 Methodology.** Data was used as provided where the form and source of data supported this approach. MTBOMF was the only variable requiring analysis. To determine MTBOMF, the MTBOMF of LRSM Sub-systems was converted from Mean Rounds to Mean Time dependencies and combined to calculate a system MTBOMF value.

Conversion from rounds to hours was completed in order to provide a consistent basis for comparison of the two systems. The mortar is the sub-system with greatest failure dependency on rounds fired. It is also assumed to have a very low failure rate. The carrier on the other hand accounts for the bulk of system failures. Hours are a valid dependency for the carrier.

**F-5 Analysis.** Analysis was conducted to determine RAM for the NLOS-CA and LRSM systems and is summarized in Table F-1:

TABLE F-1

## NLOS-CA LIA RAM SUMMARY

|                |    | N L O S | L R S M |         |
|----------------|----|---------|---------|---------|
|                |    |         | LIGHT   | HEAVY   |
| MTBOMF         |    | 161(a)  | 152(b)  | 79.8(c) |
| MTBUMA         |    | 22.9(d) | 26.4(e) | 13.1(e) |
| MTTR           | UL | .72     | 1.4(f)  | N/A(h)  |
|                | DS | 2.25    | 2.1(f)  | N/A     |
|                | GS | 5.5     | 5.5(f)  | N/A     |
| MR             |    | .12     | .13(g)  | .38(g)  |
| A <sub>1</sub> |    | .93     | .97     | .91     |

Table 1 NOTES: MTBOMF for the LRSM was calculated as follows:

a. Light Configuration:

(1) Convert MRBOMF to MTBOMF.  $MTBOMF = 2150 \text{ rounds (MRBOMF)} / 62.5 \text{ rounds per 96 hr engagement} * 7.4 \text{ hours weapon system operating time per engagement.}$

(2) Calculate System MTBOMF

$MTBOMF \text{ system} = 1 / \text{SUM (Failure Rate Sub-Systems)}$

$F(R) \text{ Failure Rate} = 1 / MTBOMF,$

$F(r) \text{ carrier} = .0027,$

$F(r) \text{ mortar} = .0039;$

$MTBOMF \text{ system} = 1 / (.0027 + .0039) = 152$

b. Heavy Configuration:

(1) Convert MRBOMF to MTBOMF.  $MTBOMF (Hvy) = 2680 \text{ rounds (MRBOMF)} / 147 \text{ rounds per 96 hr engagement} * 14.8 \text{ hours weapon system operating time per engagement.}$

(2) Calculate System MTBOMF

$MTBOMF \text{ system} = 1 / \text{SUM (Failure Rate Sub-Systems)}$

$F(R)$  Failure Rate =  $1/MTBOMF$ ,

$F(r)$  carrier = .0088,

$F(r)$  mortar = .0037;

c.  $MTBOMF$  system =  $1/ (.0088+.0037) = 79.8$

d. System  $MTBUMA$

e. Carrier  $MTBUMA$ . Mortar maintenance is negligible.

f. Carrier  $MTTR$ . Mortar maintenance is negligible.

g. Carrier  $MR$ . Mortar maintenance is negligible.

h. Mortar  $MTTR$  is negligible. Carrier  $MTTR$  was not available.

**NON-LINE OF SIGHT - COMBINED ARMS (NLOS-CA)  
MANPOWER, PERSONNEL AND LOGISTICS IMPACT ANALYSES (LIA)**

**APPENDIX G  
ANALYTICAL HIERARCHY PROCESS ANALYSIS**

**G-1 Introduction.** The objective of this analysis was "to determine the logistics impact of fielding the NLOS-CA system." This required the assessment and comparison of two alternative designs across 46 hierarchical criteria: six (6) EEA, nine (9) sub-analyses, and 31 MOP/MOEs. Cassady and Goodwin (May 1992) have described several operational research techniques for resolving this difficult integration problem as it applies to COEAS. The Analytical Hierarchy Process (AHP) is one technique. The AHP and supporting software was accessible for use in this analysis and was applied to the assessment of the relative logistics impact of NLOS-CA alternatives. Commercial software entitled "Expert Choice (TM)" was used to document, execute and support this application of AHP. "Expert Choice" is a Trademark of Decision Support Software, Inc.

**G-2 References.**

Cassady, Patrick G. and Goodwin, Gordon J., Multi-attribute Methodologies for Decision Making in COEAS, Project ID 6063, U.S. Army TRADOC, Ft Monroe, VA, May 1992.

Expert Choice (TM), Version 8, User Manual, Expert Choice, Inc, Decision Support Software, Inc, McLean, VA, 1983.

Saaty, Thomas L., The Analytic Hierarchy Process, McGraw-Hill Book Company, New York, 1980.

**G.3 Methodology.** The AHP is a decision support methodology based on comparison of alternatives against interrelated, multi-level criteria. To apply AHP, the analyst makes pairwise comparisons of alternatives and criteria based on an overall goal or objective. The decisions made at each comparison are quantified and combined mathematically to produce weighted priority rankings for choices at all levels of the hierarchy.

The AHP methodology has several advantages including the following:

- AHP structures the analysis by forcing the analyst to define analysis objectives, decision criteria and the relationships between those assessment criteria.

- AHP simplifies complex decisions by reducing the analysis process to the execution of pairwise decisions.
- Quantifies subjective judgments by assigning numerical values to judgments of degree.
- By quantifying all decisions, AHP allows the analyst to mix subjective and objective decisions.
- Measure the inconsistency of the decision tree.
- Supports what-if, sensitivity analysis of decision structure and outcomes.

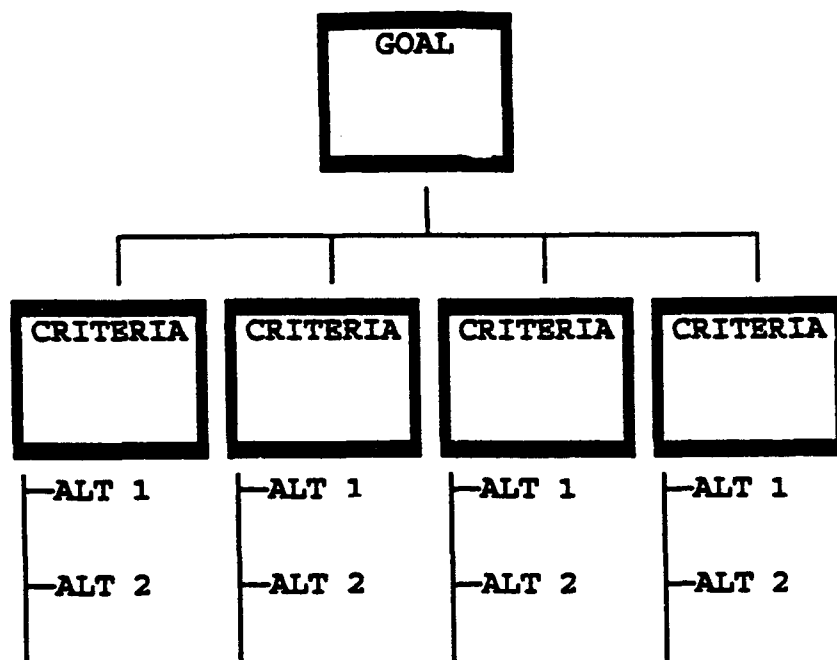
The AHP also has several disadvantages as an analytical tool in this application.

- Execution of the methodology requires the application of judgment in assigning relative weights and making comparisons. As in all analysis, the quality of the output depends on the quality of the input decisions and judgments. Ideally, a number of subject matter experts would be queried to produce a consensus on relative weights and rankings required by AHP. However, time and resource constraints limited the contractor's ability to marshall this level of support. Judgments were produced by the analyst based on over 20 years experience in military logistics, and qualifications as Professional Engineer (P.E.) and Certified Professional Logistician (CPL). The basis for those judgments is documented to the greatest level of detail feasible.
- The mathematics on which the AHP is based can mask the influence of specific decisions on the analytical outcome as decisions at each level are "rolled" into calculations at the next higher level to produce an overall ranking of alternatives. A limited sensitivity analysis was conducted to test the sensitivity of the analysis to gross changes in decision weights. The results of sensitivity analyses are documented below.

The intent of this analysis is not to produce an absolute "measure" of logistics impact, but to assist the user of the report in understanding the overall perspective and relative influence of criteria on relative logistics impact. Further investigation of the AHP hierarchy is suggested.

The first step in conducting the AHP is definition of the analysis goal and construction of the analytical hierarchy. A generic representation of an analytical hierarchy is shown in Figure G-1.

WHICH ALTERNATIVE HAS THE GREATER IMPACT?



**FIGURE G-1 Generic Analytical Hierarchy**

The hierarchy describes the relationships and dependencies between criteria at each level of analysis.

The complete analytical hierarchy used for this analysis is depicted in Figure G-2.

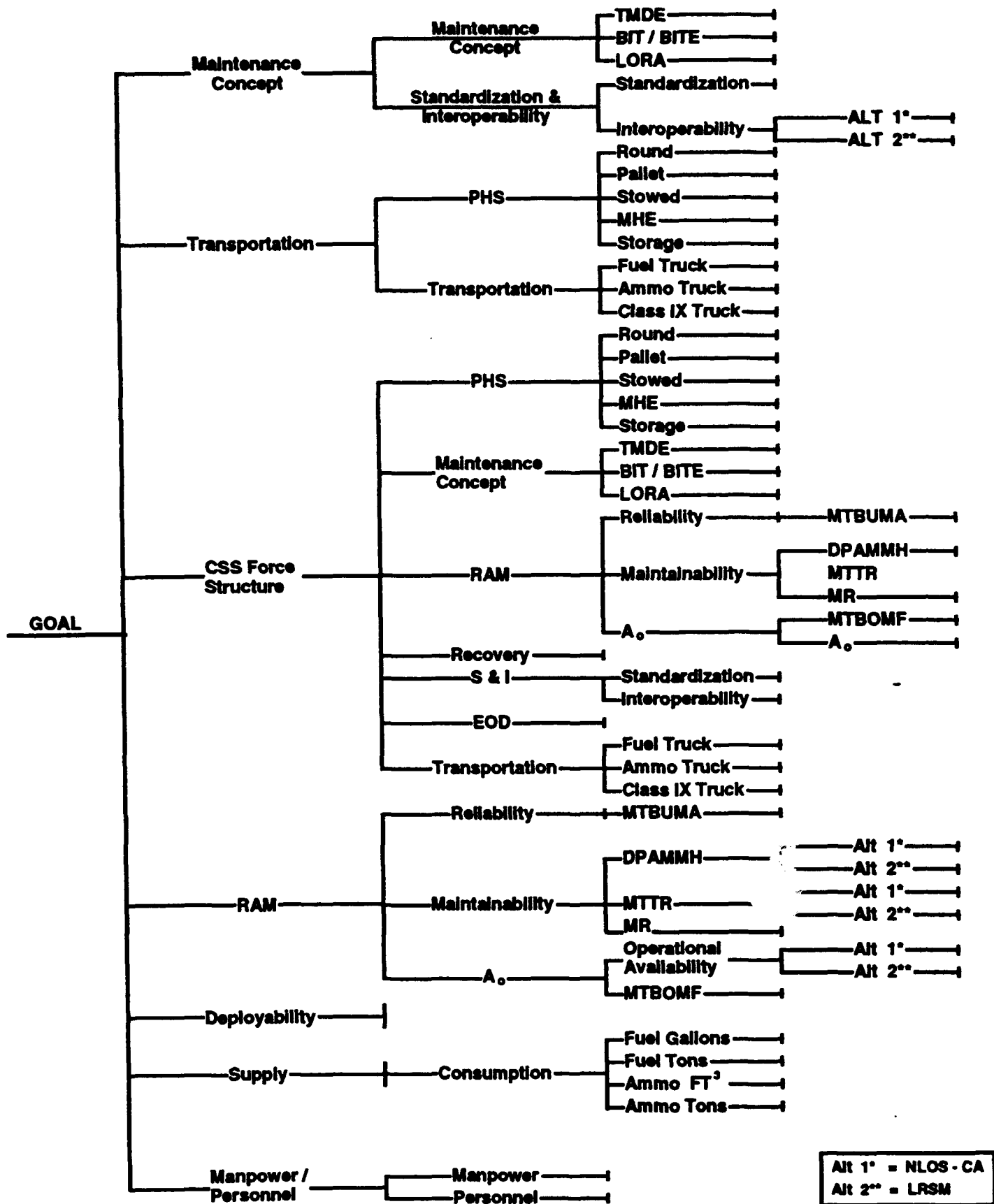
The analysis goal is at the top of the hierarchy. Alternatives were placed at the bottom. The impact of the criteria at each level on the goal is determined by the impact of the criteria at the next lower level and by relationships between criteria/nodes at the same level. The analytical hierarchy created for the NLOS-CA LIA has five levels.

- Goal: The goal of the analysis is to determine the relative logistics impact of the alternative configurations defined as the NLOS-CA and the LRSM.
- EEA: The second level of analysis is EEA. As directed by the COEA, there are seven EEAs. Manpower/personnel is included as a single EEA. Logistics impact is ultimately determined by the relative influence and impact of the EEAs.
- Sub-analysis: The relative influence of EEAs is determined in part by the results of sub-analyses. There are nine (9) sub-analyses. Their relationship to individual EEAs is summarized in the Sub-analysis to EEA matrix, Figure 4-2.
- MOP/MOE: The relative influence of sub-analyses on the logistics impact is determined by associated MOP/MOEs. There are thirty-one (31) MOPs/MOEs.
- Alternatives: Alternatives 1 and 2 are placed at the bottom of the hierarchy.

The decision model incorporated in Expert Choice will rank the alternatives at the bottom of the hierarchy against the goal according to the relative importance of the criteria using matrix algebra.

The most critical analytical step in the AHP is the definition of the decision hierarchy. Once that is complete, each node at each level is compared to peer nodes one at a time in a process named pairwise comparison. This approach relieves the analyst of the virtually impossible task of assessing the relative impact of 31 MOPs/MOEs via one analytical step and of attempting to compare unrelated variables such as tons of ammunition and manpower requirements.

Alternatives were compared against each other in each MOP/MOE and a relative magnitude assigned to the differences. For example, alternative 1 requires 2 times as many gallons of fuel per day as Alternative 2.



**FIGURE G-2 Logistics Impact**

- The relative influence of each MOP was compared to other MOPs for each sub-analysis. For example, the influence of gallons of fuel per day is much stronger (5 times) than tons of Class IX per day on the logistics impact of supply.
- The relative influence of each sub-analysis on the logistics impact of associated EEAs was then assessed. For example, manpower is 3 times more important than supply in determining the logistics impact of the CSS Force Structure EEA.
- Each EEA was compared against other EEAs to determine the relative influence of each on overall logistics impact of the alternatives.

Comparisons at each node are quantified, and the values entered in a decision matrix. Matrix algebra is used to calculate weights and to rank the choices by those weights at each level and for the entire hierarchy.

An inconsistency factor is also calculated via matrix algebra. If the analyst determines, that A is greater than B and B is greater than C. Then, logically, A should be greater than C. This is not always true when making subjective comparisons. The AHP incorporates logical inconsistencies within the analysis process. Then, some inconsistency is usually desired in subjective decision making environment, however, the inconsistency factor enables the analyst to evaluate the decision matrix and reduce undesired inconsistency.

#### G.4 Analysis:

The execution of the AHP is a series of pairwise comparisons between each criteria. The following rules were applied to comparisons:

- When values were available, as in the case of many MOPs, these values were used as the basis for comparison. Subjective evaluations were made in the absence of hard data. In making these comparisons, logistics impact was always measured as "negative," i.e., an increased burden or requirement.
- Criteria for assessing logistics impact were defined to aid the analysis process. Logistics impact was assessed according to three levels: force structure impacts, pipeline volume impacts and process/procedure impacts.
- Force Structure impacts include changes which increase manpower, or equipment requirements, or which require significant TOE changes.
- Pipeline volume impacts are increases in supply or workload

volume which increase the burden on the logistics system, but which do not measure or increase manpower or equipment requirements. Increases in tons of ammunition is a pipeline volume impact. Increases in transportation truckloads is a force structure impact.

- Process or procedure impacts change the organization or procedures for providing support. When a maintenance support concept changes, for example, the reorganization driven by this change has a significant impact on the logistics system, but force structure impacts may be minimal if workload is only reallocated among existing assets.
- Force Structure impacts are greater than Pipeline volume impacts and both are greater than process or procedure impacts.

**G.4.1 Comparison by MOP/MOE.** Comparisons and weighing of alternatives at the MOP level were based on the results of analysis conducted for each MOP/MOE. A summary of the results of those comparisons is provided in **Figure G-3.** Comparison and weighing of EEA influences on logistics impact were subjective judgments based on the analysts' experience and expertise in military logistics. Those comparisons are summarized as follows:

#### **TRANSPORTATION EEA vs MAINTENANCE EEA**

Both EEAs have potential force structure impacts. Transportation affects the number of trucks and truck driven manpower. The Maintenance EEA deals with organization and process for providing maintenance support. Manpower and force structure changes are secondary in the maintenance EEA.

The Transportation EEA, however, has a direct impact on force structure. Any change in the number of trucks required to support the weapon system, also has a direct impact on manpower, fuel, and repair parts as well as equipment.

**Assessment:** The Transportation EEA has a great influence on logistics impact than the Maintenance EEA.

#### **CSS FORCE STRUCTURE vs MAINTENANCE**

Force Structure EEA changes drive changes in manpower, process, and organization. The Maintenance EEA drives changes in the maintenance process and organization only.

**Assessment:** Force Structure has a greater influence on logistics impact than the Maintenance EEA.

The Logistics Impact of NLOS - CA is How Many Times Greater Than the Logistics Impact of the LRSM?

| NLOS - CA                   | <div> <div>NLOS - CA &gt; LRSM</div> <div>Scale</div> <div>LRSM &gt; NLOS - CA</div> </div> |   |   |   |   |   |   |   |   |  | LRSM                        |
|-----------------------------|---|---|---|---|---|---|---|---|---|--|-----------------------------|
|                             | Equal   |   |   |   |   |   |   |   |   |  |                             |
| Fuel Gal Per Day            | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | Fuel Gal Per Day            |
| Fuel Tons Per Day           | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | Fuel Tons Per Day           |
| Ammo Tons Per Day           | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | Ammo Tons Per Day           |
| Ammo CUFT Per Day           | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | Ammo CUFT Per Day           |
| Round Dimensions            | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | Round Dimensions            |
| Pallet Size                 | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | Pallet Size                 |
| Stowed Rounds               | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | Stowed Rounds               |
| Material Handling Equipment | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | Material Handling Equipment |
| Storage                     | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | Storage                     |
| TMDE                        | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | TMDE                        |
| Maintenance Concept         | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | Maintenance Concept         |
| MTBOMF                      | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | MTBOMF                      |
| MTBUMA                      | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | MTBUMA                      |
| MTTR                        | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | MTTR                        |
| MR                          | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | MR                          |
| DPAMMH                      | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | DPAMMH                      |
| A <sub>0</sub>              | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | A <sub>0</sub>              |
| Fuel Trucks Per Day         | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | Fuel Trucks Per Day         |
| Ammo Trucks Per Day         | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | Ammo Trucks Per Day         |
| Deployability               | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | Deployability               |
| Recoverability              | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | Recoverability              |
| EOD                         | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | EOD                         |
| Standardization             | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | Standardization             |
| Interoperability            | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | Interoperability            |
| Manpower                    | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | Manpower                    |
| Personnel                   | 9   | 7 | 5 | 3 | 1 | 3 | 5 | 7 | 9 |  | Personnel                   |

1 = Equal  
 3 = Moderately Greater  
 5 = Strongly Greater  
 7 = Very Strongly Greater  
 9 = Extremely Greater

SCALE

▲ = Location on Scale

LOGISTICS IMPACT COMPARISON SUMMARY  
NLOS-CA vs LSRM for MOP / MOE

FIGURE G - 3

#### **RAM vs MAINTENANCE**

Changes in RAM impact the logistics support volume at the system level, i.e. more man-hours, more repair actions, more repair parts. These changes do not convert to force structure (manpower and equipment) impacts until they are aggregated in the manpower, and supply EEAs. The maintenance EEA addresses process and organization.

Assessment: RAM and Maintenance have equal influence on logistics impact.

#### **TRANSPORTABILITY/DEPLOYABILITY vs MAINTENANCE**

The Transportability/deployability EEA addresses the logistics resources and support required to conduct intra- and inter theater movement of units. Transportability/deployability determines transport aircraft requirements and support (fuel, maintenance, operations, etc), and other modes of transportation and support.

Assessment: Transportability/deployability has a greater influence on logistics impact.

#### **SUPPLY vs MAINTENANCE**

The Supply EEA measures changes in volume of supplies moving through the pipeline. Impacts are indirect. They include increased workload, efficiency, and overhead. Volume is not converted to force structure at this point, but is converted in the Transportation EEA.

Assessment: Supply and Maintenance have equal influence on logistics impact.

#### **MANPOWER vs MAINTENANCE**

The Manpower EEA addresses the impacts of changes in manpower requirements. The impact on logistics forces structure is therefore significant.

Assessment: Manpower/Personnel has greater influence on logistics impact.

#### **CSS FORCE STRUCTURE vs TRANSPORTATION**

CSS Force Structure changes affect equipment, manpower and organization for logistics support. The Transportation EEA reflects the logistics changes of impacts in one functional area-supply.

Assessment: CSS Force Structure has a greater influence on logistics

impact.

#### **TRANSPORTATION vs RAM**

Changes in the RAM EEA impact the volume of logistics support. The forces structure impacts of RAM changes is documented in other EEAs. Transportation, measures increase or decrease in truckloads and support resources required to move Class III, V, and IX supplies.

Assessment: Transportation has a greater influence on logistics impact.

#### **DEPLOYABILITY VS TRANSPORTATION**

Deployability and Transportation EEAs both impact equipment and manpower support requirements. However, deployability addresses the air transportation resources which are a scarce resource and which entail a broader spectrum of dedicated support.

Assessment: Transportability/deployability and Transportation EEAs have an equal influence on logistics impact.

#### **TRANSPORT vs SUPPLY**

The Transport EEA includes equipment and manpower impacts. The Supply EEA addresses logistics pipeline process volume.

Assessment: Transportation has greater influence on logistics impact.

#### **TRANSPORT vs MANPOWER**

Transportation and Manpower EEAs both impact equipment and manpower requirements. Manpower, however, includes manpower requirements in all functional areas.

Assessment: Manpower/Personnel has a greater influence on logistics impact than Transportation.

#### **CSS vs RAM**

CSS Force Structure reflects impacts on equipment, manpower and process for logistics support. RAM reflects pipeline volume impacts.

Assessment: CSS Force Structure has a greater influence on logistics impact.

#### **CSS FORCE STRUCTURE vs DEPLOYABILITY**

Both EEAs reflect impacts on force structure. CSS Force Structure is more comprehensive, however, Deployability is more critical to readiness and involves scarce air transport resources.

Assessment: These EEAs have an equal influence on logistics impact.

#### **CSS FORCE STRUCTURE vs SUPPLY**

CSS Force Structure is comprehensive force structure impacts. Supply is pipeline volume impacts.

Assessment: CSS Force Structure has greater influence on logistics impact.

#### **MANPOWER vs CSS FORCE STRUCTURE**

Both affect force structure/manpower requirements. The Manpower EEA has a stronger effect on logistics impact because it includes operators and other non-logistics, non-system specific manpower requirements.

Assessment: Both EEAs have an equal influence on logistics impact.

#### **TRANSPORTABILITY/DEPLOYABILITY vs RAM**

Transportability/deployability drives force structure requirements for transport assets and support. RAM affects logistics pipeline volume.

Assessment: Transportability/Deployability has a great influence on logistics impact.

#### **SUPPLY vs RAM**

Both are volume impacts. Supply has moderately more logistics impact because of the magnitude of the supplies involved and the handling requirements for those supplies.

Assessment: Both EEAs have an equal influence on logistics impact.

#### **MANPOWER vs RAM**

Manpower/personnel is a force structure/resource issue. RAM is a pipeline volume issue.

Assessment: Manpower/personnel has a greater influence on logistics impact.

## TRANSPORTABILITY/DEPLOYABILITY vs SUPPLY

Transportability/deployability is a force structure issue. Supply is a pipeline volume issue.

Assessment: Transportability/deployability has a greater influence on logistics impact.

## SUPPLY vs MANPOWER/PERSONNEL

Supply is a pipeline volume issue. Manpower/personnel affects force structure and support resource requirements.

Assessment: Manpower/personnel has a greater influence on logistics impact.

**G.4 Logistics Impact Summary.** The relative logistics impact of Alternative 1 and 2 overall, and in each EEA are displayed in Figure G-4. The height of each bar represents the priority weighing calculated by the AHP. Figure G-5 shows the relative influence and weight of each of the EEAS in determining the overall logistics impact. Clearly, Force Structure exerted the greatest influence in determining logistics impact. Supply exerted the least influence. The final priority values calculated for each alternative are a function of judgments and decisions made in performing comparisons at each level of the hierarchy. It is appropriate to question the impact of judgmental errors on the outcome of the analysis. Given sufficient time and resources, a complete sensitivity analysis should be conducted to assess the risk associated with the analytical hierarchy applied in this assessment. In this case a limited sensitivity assessment of two variables was conducted. In the first sensitivity analysis, the priority weight of CSS Force Structure was reduced by a factor of ten. In the second sensitivity analysis, the priority weight of the supply EEA was increased by a factor of ten. The results of these analyses are displayed in Figure G-6. It is apparent that significant changes in these two variables had little impact on overall logistics impact.

**G.5 Conclusions.** The logistics impact of the LRSM is marginally greater than the logistics impact of the NLOS-CA. CSS Force Structure is the most important variable in determining these differences, supply being the least important. Sensitivity analyses which varied CSS Force Structure and Supply showed overall logistics impact to be relatively insensitive to changes in criteria weights. This indicates there is no single supportability factor which can be changed to affect the relative impact of the two alternatives.

# LOGISTICS IMPACT SUMMARY

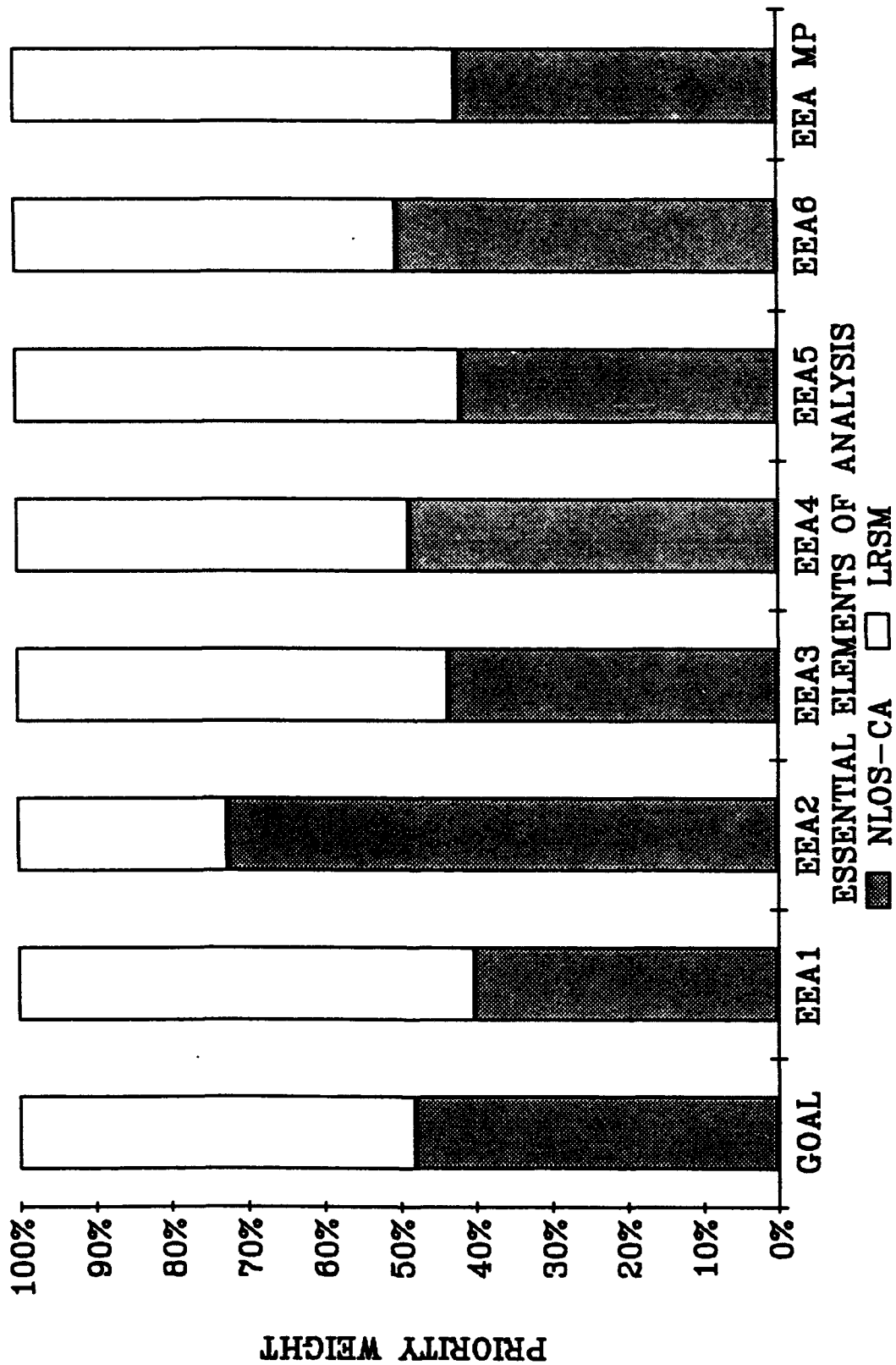


FIGURE G-4

EEA RELATIVE WEIGHT VS LOG IMPACT

LRSM=.520 NLOS-CA=.480

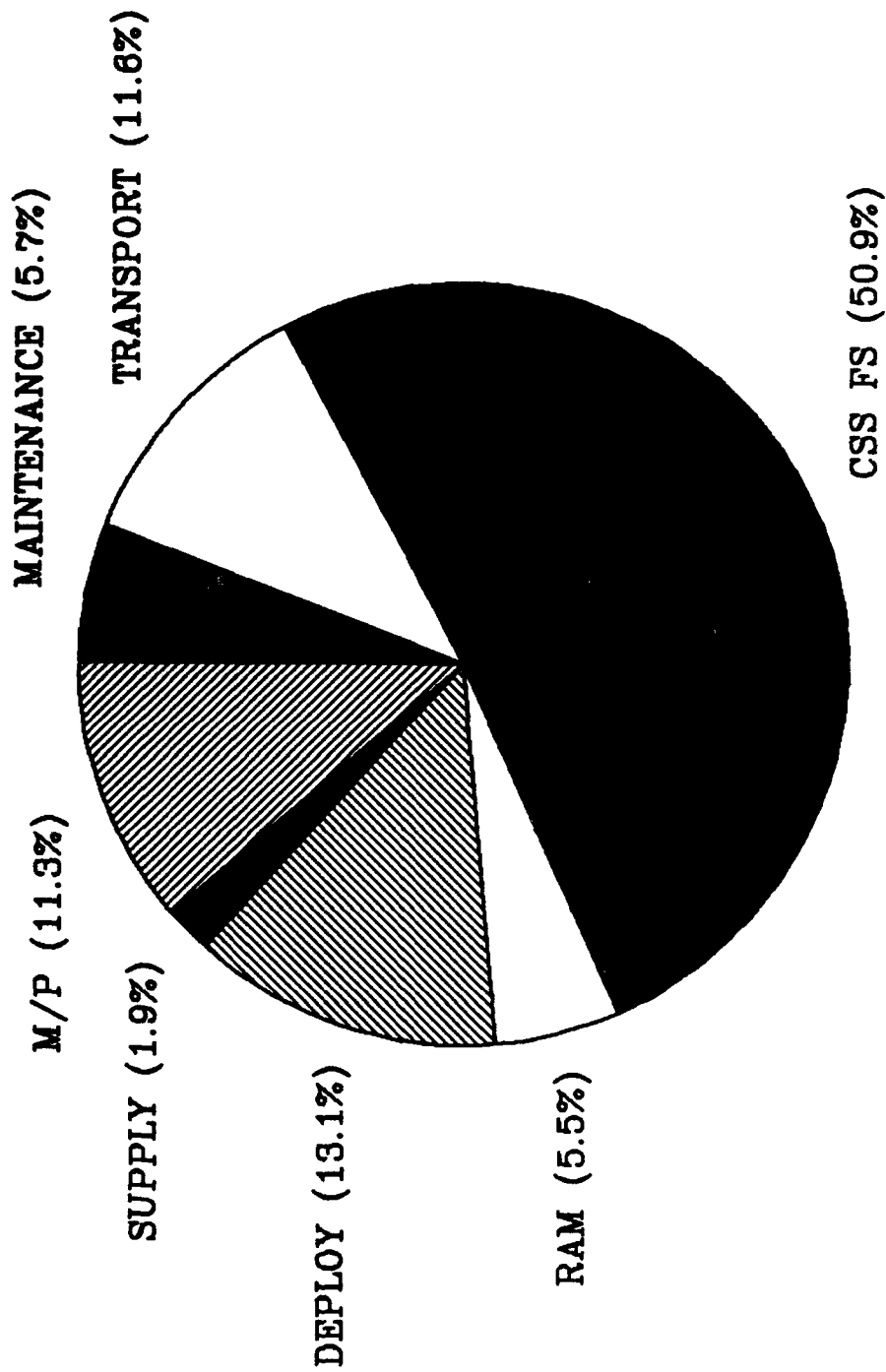


FIGURE G-5

# SENSITIVITY RESULTS RELATIVE LOGISTICS IMPACT

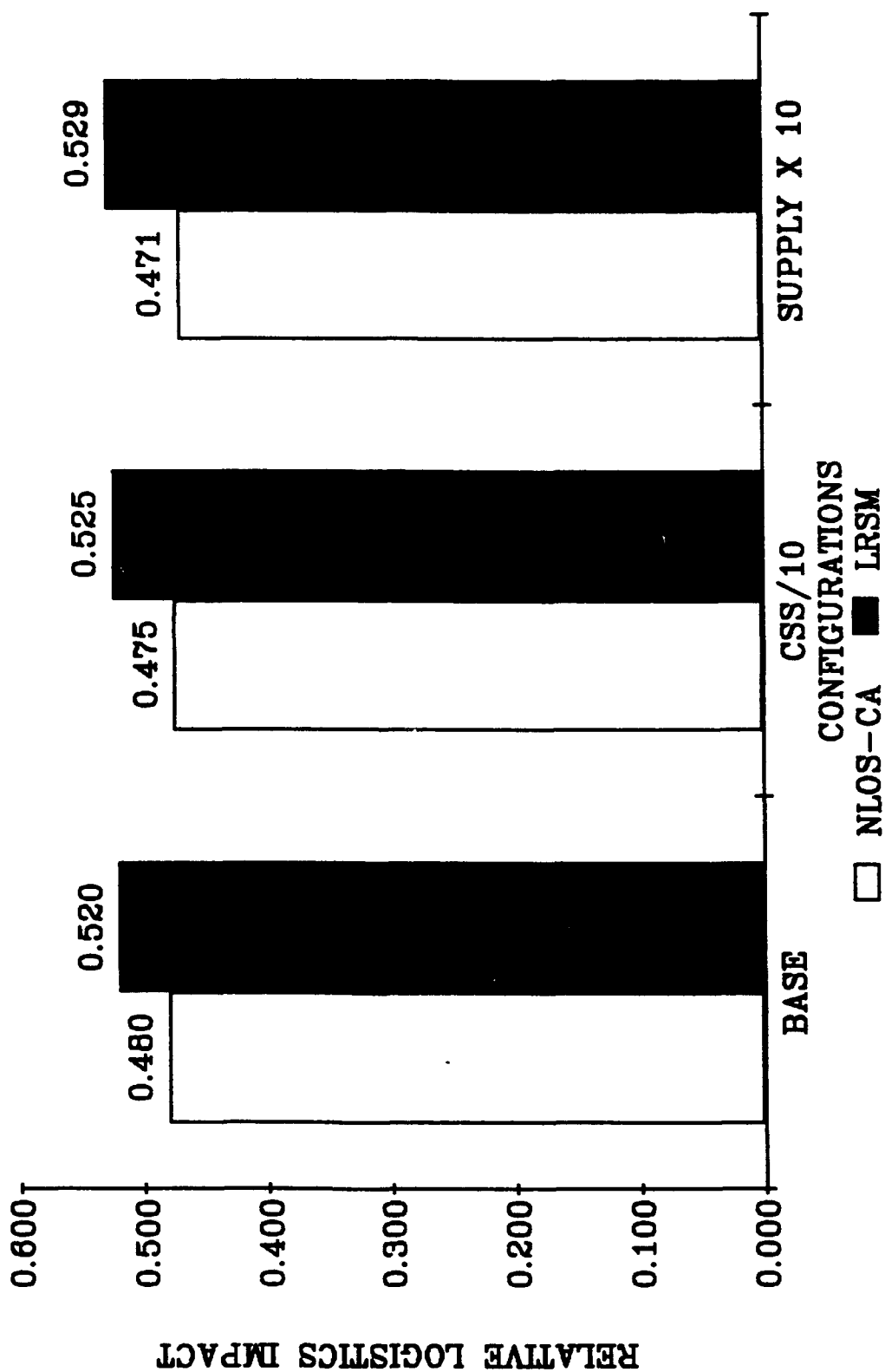


FIGURE G-6

**NON-LINE OF SIGHT - COMBINED ARMS (NLOS-CA)  
MANPOWER, PERSONNEL AND LOGISTICS IMPACT ANALYSES (LIA)**

**APPENDIX H  
MANPOWER TABLES**

TABLE H-1

## UNIT MANPOWER REQUIREMENTS NLOS-CA CO HEAVY DIVISION LRSN

| NOS      | DTOE<br>NLOS LRSN<br>CO HVY | PROJECTED<br>NLOS LRSN<br>CO HVY | DELTA<br>DTOE VS<br>PROJECTED | NLOS CO<br>LRSN<br>PROJECTED GRADE |
|----------|-----------------------------|----------------------------------|-------------------------------|------------------------------------|
| 11A00    | 0.00                        | 0.00                             | 0.00                          | 0.00 D5                            |
| 11A00    | 0.00                        | 0.00                             | 0.00                          | 0.00 D4                            |
| 11A00    | 1.00                        | 1.00                             | 0.00                          | 1.00 D3                            |
| 11A00    | 4.00                        | 4.00                             | 0.00                          | 4.00 D2                            |
| 11C5M    | 1.00                        | 1.00                             | 0.00                          | 1.00 E8                            |
| 11C50    | 2.00                        | 2.00                             | 0.00                          | 2.00 E8                            |
| 11C40    | 4.00                        | 4.00                             | 0.00                          | 4.00 E7                            |
| 11C30    | 4.00                        | 4.00                             | 0.00                          | 4.00 E6                            |
| 11C20    | 16.00                       | 16.00                            | 0.00                          | 16.00 E5                           |
| 11C10    | 24.00                       | 24.00                            | 0.00                          | 24.00 E4                           |
| 11C10    | 32.00                       | 32.00                            | 0.00                          | 32.00 E3                           |
| 24M10    | 0.00                        | 0.00                             | 0.00                          | 0.00 E4                            |
| 24M10    | 0.00                        | 0.00                             | 0.00                          | 0.00 E3                            |
| 31U30    | 1.00                        | 1.00                             | 0.00                          | 1.00 E6                            |
| 31U20    | 0.00                        | 0.00                             | 0.00                          | 0.00 E5                            |
| 31U10    | 1.00                        | 1.00                             | 0.00                          | 1.00 E4                            |
| 52D10    | 0.00                        | 1.00                             | 1.00                          | 1.00 E4                            |
| 54B20    | 1.00                        | 1.00                             | 0.00                          | 1.00 E5                            |
| 54B10    | 0.00                        | 0.00                             | 0.00                          | 0.00 E4                            |
| 63B20    | 1.00                        | 1.00                             | 0.00                          | 1.00 E5                            |
| 63B10    | 1.00                        | 1.00                             | 0.00                          | 1.00 E4                            |
| 63B10    | 1.00                        | 0.00                             | -1.00                         | 0.00 E3                            |
| 63J20    | 0.00                        | 0.00                             | 0.00                          | 0.00 E5                            |
| 63J10    | 0.00                        | 1.00                             | 1.00                          | 1.00 E4                            |
| 63J10    | 0.00                        | 0.00                             | 0.00                          | 0.00 E3                            |
| 63S20    | 0.00                        | 0.00                             | 0.00                          | 0.00 E5                            |
| 63S10    | 0.00                        | 2.00                             | 2.00                          | 2.00 E4                            |
| 63S10    | 0.00                        | 0.00                             | 0.00                          | 0.00 E3                            |
| 63T40    | 1.00                        | 1.00                             | 0.00                          | 1.00 E7                            |
| 63T30    | 1.00                        | 1.00                             | 0.00                          | 1.00 E6                            |
| 63T20    | 2.00                        | 2.00                             | 0.00                          | 2.00 E5                            |
| 63T10    | 2.00                        | 3.00                             | 1.00                          | 3.00 E4                            |
| 63T10    | 1.00                        | 1.00                             | 0.00                          | 1.00 E3                            |
| 77F20    | 0.00                        | 0.00                             | 0.00                          | 0.00 E5                            |
| 77F10    | 0.00                        | 0.00                             | 0.00                          | 0.00 E4                            |
| 77F10    | 1.00                        | 1.00                             | 0.00                          | 1.00 E3                            |
| 88M30    | 1.00                        | 0.00                             | -1.00                         | 0.00 E6                            |
| 98M20    | 2.00                        | 1.00                             | -1.00                         | 1.00 E5                            |
| 88M10    | 0.00                        | 2.00                             | 2.00                          | 2.00 E4                            |
| 88M10    | 0.00                        | 0.00                             | 0.00                          | 0.00 E3                            |
| 92A10    | 0.00                        | 0.00                             | 0.00                          | 0.00 E4                            |
| 92A10    | 1.00                        | 1.00                             | 0.00                          | 1.00 E3                            |
| 92Y30    | 1.00                        | 1.00                             | 0.00                          | 1.00 E6                            |
| 92Y20    | 0.00                        | 0.00                             | 0.00                          | 0.00 E5                            |
| 92Y10    | 1.00                        | 1.00                             | 0.00                          | 1.00 E4                            |
| 92Y10    | 0.00                        | 0.00                             | 0.00                          | 0.00 E3                            |
| 94B10    | 1.00                        | 1.00                             | 0.00                          | 1.00 E4                            |
| OFFICER  | 5.00                        | 5.00                             | 0.00                          | 5.00                               |
| WARRANT  | 0.00                        | 0.00                             | 0.00                          | 0.00                               |
| ENLISTED | 104.00                      | 107.00                           | 3.00                          | 107.00                             |
| TOTAL    | 109.00                      | 112.00                           | 3.00                          | 112.00                             |

TABLE H-2

## FRACTIONAL MANPOWER REQUIREMENTS FOR DS AND GS MAINT DEMAND

## DS MPR BY MOS

|     |        |
|-----|--------|
| 27E | 0.8131 |
| 27U | 0.0000 |
| 29E | 0.2209 |
| 29J | 0.0103 |
| 29N | 0.0550 |
| 29S | 0.0007 |
| 35H | 0.0460 |
| 39E | 0.1507 |
| 43M | 0.0000 |
| 44B | 0.0033 |
| 44E | 0.0008 |
| 45B | 0.0424 |
| 456 | 0.0008 |
| 52D | 0.1646 |
| 62B | 0.0209 |
| 63H | 1.2068 |
| 63J | 0.0863 |
| 63W | 0.3444 |

## GS MPR BY MOS

|     |        |
|-----|--------|
| 27E | 0.5087 |
| 27U | 0.0000 |
| 29E | 0.0447 |
| 29N | 0.0115 |
| 29S | 0.0018 |
| 35H | 0.0762 |
| 39B | 0.0016 |
| 39E | 0.0417 |
| 44B | 0.0017 |
| 44E | 0.0000 |
| 45B | 0.0107 |
| 456 | 0.0036 |
| 52D | 0.0954 |
| 62B | 0.0069 |
| 63H | 0.6165 |
| 63J | 0.0659 |
| 63W | 0.2298 |

TABLE H-3

## 11C POSITIONS BY PARAGRAPH

| PARA | FUNCTIONAL AREA | E8 | E7 | E6 | E5 | E4 | E3 | TOTA |
|------|-----------------|----|----|----|----|----|----|------|
| 101  | HQ SECTION      | 1  |    |    |    |    | 2  | 3    |
| 103  | PLATOON HQ      | 2  | 0  | 0  | 0  | 0  | 2  | 4    |
| 104  | MORTAR SECTION  |    | 4  | 4  | 4  | 0  | 4  | 16   |
| 105  | MORTAR SQUAD    |    | 0  | 0  | 12 | 24 | 24 | 60   |
|      | LRSN CO TOTAL   | 3  | 4  | 4  | 16 | 24 | 32 | 83   |

## 11C POSITIONS BY PARAGRAPH

| PARA | FUNCTIONAL AREA | E8 | E7 | E6 | E5 | E4 | E3 | TOTA |
|------|-----------------|----|----|----|----|----|----|------|
| 101  | HQ SECTION      | 1  |    |    |    |    | 2  | 3    |
| 103  | PLATOON HQ      | 2  | 0  | 0  | 0  | 0  | 2  | 4    |
| 104  | MORTAR SECTION  |    | 4  | 4  | 4  | 0  | 4  | 16   |
| 105  | MORTAR SQUAD    |    | 0  | 0  | 12 | 24 | 24 | 60   |
|      | LRSN CO TOTAL   | 3  | 4  | 4  | 16 | 24 | 32 | 83   |

|                   |   |   |   |    |    |    |    |
|-------------------|---|---|---|----|----|----|----|
| BATTALION TOTAL   | 3 | 4 | 4 | 16 | 24 | 32 | 83 |
| NON SYSTEM DRIVEN | 3 | 4 | 4 | 4  | 0  | 8  | 23 |
| SYSTEM DRIVEN     | 0 | 0 | 0 | 12 | 24 | 24 | 60 |

TABLE H-4

## EQUIPMENT SECTION MLOS-CA CO HEAVY DIVISION LRSN

| LIN      | NOMENCLATURE                                    | QTY<br>REQ |
|----------|---|------------|
| A22496   | AIMING CIRCLE                                   | 4          |
| A32355   | ALARM CHEM AGENT                                | 5          |
| A56243   | ANALYZER SET ENGINE                             | 1          |
| A79381   | ANTENNA GROUP OE-254(1)/GRC                     | 11         |
| A79449   | ANTENNA GROUP OE-303/GRC                        | 1          |
| C05341   | CONTROL REC TRANS: C-11561(C)/U                 | 3          |
| C05701   | MONITOR CHEM AGENT                              | 2          |
| C10990   | CARRIER 120MM MORTAR                            | 12         |
| C10990 * |   | 12         |
| C10990 * |   | 12         |
| C18234   | CARRIER PERS FULL TRXED ARMD (RISE)             | 4          |
| C18234 * |   | 4          |
| C18234 * |   | 4          |
| C60294   | COMPUTER SET BALLISTICS: MORTAR M23             | 8          |
| C62375   | BATTERY CASE: Z-AIJ-EI                          | 3          |
| D11538   | CARRIER COMMAND POST: LT TRACKED                | 1          |
| D11538 * |   | 1          |
| D11538 * |   | 1          |
| D11538 * |   | 1          |
| D99573   | CHARGER BATTERY: PP-34/MSM                      | 1          |
| E00533   | CHARGER RADIAC DETECT                           | 5          |
| E56896   | CMBT VEH ANTI TANK: IMP TOW W/O TON MPN SYS     | 0          |
| E63728   | COMPASS MAGNETIC UNMTD                          | 16         |
| E70064   | COMP UNIT RCP TRK 2 MHL PNEU TIRE GAS DRVN      | 1          |
| E98103   | ELEC TRANSFER KEY KYK-13/TSEC                   | 3          |
| F55553   | DISTRIBUTION SYS ELEC 120V 1PH 60AMP            | 1          |
| G11966   | GEN SET DED SKID MTD 5KW 60HZ                   | 1          |
| G18358   | GEN SET DED SKID MTD 3KW                        | 1          |
| H25866   | HEATER RATION INDIV: MTD TRPS                   | 18         |
| J31297   | INST KIT MK-2195/VRC-87/88/90 2 1/2 5 TON       | 1          |
| J31569   | INSTL KIT 87,88,90 HMMWV                        | 1          |
| J47151   | INST KIT 87,88,89 M987,984,988                  | 0          |
| J47457   | INSTL KIT 89,91,92 HMMWV                        | 7          |
| J87848   | INSTL KIT MK-2499/VRC FOR TSEC/KY-57 WITH SINCG | 0          |
| K23814   | HEADSET-MICROPHONE: H-182/PT                    | 12         |
| L44595   | LAUNCHER GRENADE 40MM: SBLE SHOT RIFLE MTD BTCH | 0          |
| L44748   | LAUNCHER GRENADE ARMAMENT SUBSYSTEM             | 0          |
| L63994   | LIGHT SET GEN ILLUM 25 OUTLET                   | 2          |
| L67021   | LAUNCHER GRENADE SMOKE                          | 0          |
| L91975   | MACHINE GUN CALIBER .50                         | 13         |
| L92386   | MACHINE GUN 7.62MM                              | 1          |
| M09009   | MACHINE GUN 5.56MM                              | 4          |
| M12418   | MASK CBR M40                                    | 107        |
| M14381   | MAST AB-903/G                                   | 8          |
| M18526   | MASK CBR CMBT VEH M42                           | 0          |
| M60449   | MULTIMETER DIGITAL AM/PSN-45                    | 4          |
| M68405   | MORTAR 120 MM                                   | 12         |
| M68405 * |   | 12         |
| M74364   | MOUNT GUN RING CAL .50                          | 1          |
| M75577   | MOUNT TRIPOD MACH GUN HVY CAL .50               | 13         |
| M75714   | MOUNT TRIPOD MACH GUN 7.62 MM                   | 5          |
| M02758   | NET CONTROL DEVICE                              | 4          |

TABLE H-4 (CON'T)

|          |  |    |
|----------|--|----|
| N04596   | NIGHT VISION SIGHT CREW SERVED WEAPON AN/TVS-5 | 13 |
| N04732   | NIGHT VISION SIGHT INDIV SERVD WPN AN/PVS-4    | 9  |
| N05050   | NIGHT VISION SIGHT SET AN/UAS-11               | 0  |
| N05482   | NIGHT VISION GOGGLES AN/PVS-7B                 | 61 |
| P07900   | PLOTTING BOARD INDIRECT FIRE AZIMUTH           | 20 |
| P40750   | POWER SUPPLY PP-6224/U                         | 4  |
| P70517   | PURGING KIT FIRE CONTROL: ORG MAINT            | 1  |
| P98152   | PISTOL 9MM AUTOMATIC: M9                       | 15 |
| Q20935   | RADIACETER IM-93/UD                            | 8  |
| R20684   | RADIAC SET AN/VDR-2                            | 5  |
| R30895   | RADIO SET AN/GRC 213                           | 0  |
| R30925   | RADIAC SET AN/PDR-75                           | 1  |
| R67194   | RADIO SET AN/VRC-87A                           | 8  |
| R67194   | RADIO SET AN/VRC-88A                           | 12 |
| R68010   | RADIO SET AN/VRC-91A                           | 0  |
| R67908   | RADIO SET AN/VRC-90A                           | 3  |
| R45339   | RADIO SET AN/VRC-92                            | 12 |
| R55268   | RADIO SET AN/PRC-119                           | 3  |
| R56742   | REEL EQUIPMENT CE-11                           | 5  |
| R59160   | REELING MACHINE CABLE                          | 9  |
| R93169   | RADIO TEST SET AN/PRM-34                       | 1  |
| R95035   | RIFLE 5.56 MM M16A2                            | 97 |
| R97234   | RIFLE 5.56 MM M4                               | 0  |
| S01373   | SPEECH SECURITY EQUIP TSEC/KY-57               | 1  |
| T07679   | TRK UTIL HVY VARIANT HMMV                      | 0  |
| T25726   | TONE-SIGNALING ADAPTER TA-977                  | 1  |
| T39518   | TRK CGO TACT 8X8 HENMT W/M W/LT CRANE          | 3  |
| T40405   | TAPE READER GP K01-18/TSEC                     | 2  |
| T45593   | SIGHT BORE OPTICAL                             | 4  |
| T61494   | TRUCK UTIL: CGO/TRP M998 HMMV                  | 4  |
| T63093   | TRUCK WRKR TAC 8X8 HENMT W/M W/LT CRANE        | 1  |
| T87243   | TRUCK TANK FUEL SVC6 2500 GAL HENMT            | 1  |
| T87243 * |  | 0  |
| T92242   | TRK UTIL ARMT CARRIER HMMV                     | 0  |
| U82529   | SWITCHBOARD TELEPHONE MANUAL: SB-993/6T        | 4  |
| U81707   | SWITCHBOARD TELEPHONE MANUAL: SB-22/PT         | 1  |
| U89185   | UTILITY RECEPTACLE                             | 1  |
| V31211   | TELEPHONE SET TA312                            | 26 |
| V98788   | POWER SUPPLY VEN MYP-57/TSEC                   | 2  |
| W32593   | SHOP EQUIP AUTO MAINT                          | 1  |
| W32867   |  | 1  |
| W65747   | TOOL SET VEN FULL TRACKED                      | 1  |
| W95537   | TRLR CGO 3/4 TON 2 WNL W/E                     | 0  |
| W95537 * |  | 0  |
| W95811   | TRLR CGO 1 1/2T M105                           | 0  |
| W95811 * |  | 0  |
| W98825   | TRLR TANK WATER 400 GAL M149A2                 | 1  |
| X40794   | TRUCK CARGO DROP SIDE 6X6 W/E M923A1           | 0  |
| X40831   | TRUCK CARGO 5 TON 6X6 LWB W/E                  | 0  |
| Z40430   | TRUCK CGO LHTV W/E                             | 4  |
| Z09000   | LOGHARS(T) COMM MODEN BRP                      | 1  |
| Z25291   | ELECTRONIC NOTEBOOK (EN): AN/CY2-7             | 22 |
| Z28175   | GN SYS FIBER OPTICS-IT: MLOS-CA                | 0  |
| Z28175*  |  | 0  |

TABLE H-4 (CON'T)

|          |                                 |   |
|----------|---------------------------------|---|
| Z32890   | HEATER DUCT TYPE PTL            | 1 |
| Z32890 * |                                 | 1 |
| Z36068   | TLR CGO LMTV W/DROPSIDES        | 3 |
| Z36272   | TLR CGO HIGH MOBILITY           | 1 |
| Z37833   | TRMR MISSILE ASMOLY MASS SIM    | 0 |
| Z43330   | MISSILE GUIDED FIBER OPTICS     | 0 |
| Z50144   | LOGMARS(T) MICROPRO GRP         | 1 |
| Z62381   | RECOVERY VEHICLE FULL TRACKED   | 1 |
| Z62381 * |                                 | 1 |
| Z62381 * |                                 | 1 |
| Z62381 * |                                 | 1 |
| Z62381 * |                                 | 1 |
| Z62381 * |                                 | 1 |
| Z67950   | MOUNT TRIPOD MACH GUN XM192     | 1 |
| Z94047   | TRUCK TANK POL MTV W/E          | 0 |
| Z94047 * |                                 | 0 |
| Z94433   | TRUCK WRECKER MTV W/M W/E       | 0 |
| Z95931   | VEHICLE POWER CONDITIONER (VPC) | 1 |

TABLE H-5

## UNIT MANPOWER REQUIREMENTS MLOS-CA CO LIGHT DIVISION LRSH

| NOS      | DTOE      | PROJECTED | DELTA     | MLOS CO     |
|----------|-----------|-----------|-----------|-------------|
|          | MLOS LRSH | MLOS LRSH | DTOE VS   | LRSH        |
|          | CO LT     | CO LT     | PROJECTED | CO LT GRADE |
| 11A00    | 0.00      | 0.00      | 0.00      | 0.00 05     |
| 11A00    | 0.00      | 0.00      | 0.00      | 0.00 04     |
| 11A00    | 1.00      | 1.00      | 0.00      | 1.00 03     |
| 11A00    | 4.00      | 4.00      | 0.00      | 4.00 02     |
| 11CSN    | 1.00      | 1.00      | 0.00      | 1.00 E8     |
| 11CS0    | 2.00      | 2.00      | 0.00      | 2.00 E8     |
| 11C40    | 4.00      | 4.00      | 0.00      | 4.00 E7     |
| 11C30    | 4.00      | 4.00      | 0.00      | 4.00 E6     |
| 11C20    | 16.00     | 16.00     | 0.00      | 16.00 E5    |
| 11C10    | 24.00     | 24.00     | 0.00      | 24.00 E4    |
| 11C10    | 32.00     | 32.00     | 0.00      | 32.00 E3    |
| 24N10    | 0.00      | 0.00      | 0.00      | 0.00 E4     |
| 24N10    | 0.00      | 0.00      | 0.00      | 0.00 E3     |
| 31U30    | 1.00      | 1.00      | 0.00      | 1.00 E6     |
| 31U20    | 0.00      | 0.00      | 0.00      | 0.00 E5     |
| 31U10    | 1.00      | 1.00      | 0.00      | 1.00 E4     |
| 52B10    | 0.00      | 1.00      | 1.00      | 1.00 E4     |
| 54B20    | 1.00      | 1.00      | 0.00      | 1.00 E5     |
| 54B10    | 0.00      | 0.00      | 0.00      | 0.00 E4     |
| 63B20    | 1.00      | 1.00      | 0.00      | 1.00 E5     |
| 63B10    | 1.00      | 0.00      | -1.00     | 0.00 E4     |
| 63B10    | 1.00      | 1.00      | 0.00      | 1.00 E3     |
| 63J20    | 0.00      | 0.00      | 0.00      | 0.00 E5     |
| 63J10    | 0.00      | 1.00      | 1.00      | 1.00 E4     |
| 63J10    | 0.00      | 0.00      | 0.00      | 0.00 E3     |
| 63S20    | 0.00      | 0.00      | 0.00      | 0.00 E5     |
| 63S10    | 0.00      | 2.00      | 2.00      | 2.00 E4     |
| 63S10    | 0.00      | 0.00      | 0.00      | 0.00 E3     |
| 63T40    | 0.00      | 0.00      | 0.00      | 0.00 E7     |
| 63T30    | 0.00      | 0.00      | 0.00      | 0.00 E6     |
| 63T20    | 0.00      | 0.00      | 0.00      | 0.00 E5     |
| 63T10    | 0.00      | 0.00      | 0.00      | 0.00 E4     |
| 63T10    | 0.00      | 0.00      | 0.00      | 0.00 E3     |
| 77F20    | 0.00      | 0.00      | 0.00      | 0.00 E5     |
| 77F10    | 0.00      | 1.00      | 1.00      | 1.00 E4     |
| 77F10    | 1.00      | 1.00      | 0.00      | 1.00 E3     |
| 88M30    | 1.00      | 0.00      | -1.00     | 0.00 E6     |
| 88M20    | 2.00      | 0.00      | -2.00     | 0.00 E5     |
| 88M10    | 0.00      | 2.00      | 2.00      | 2.00 E4     |
| 88M10    | 0.00      | 0.00      | 0.00      | 0.00 E3     |
| 92A10    | 0.00      | 0.00      | 0.00      | 0.00 E4     |
| 92A10    | 1.00      | 1.00      | 0.00      | 1.00 E3     |
| 92Y30    | 1.00      | 1.00      | 0.00      | 1.00 E6     |
| 92Y20    | 0.00      | 0.00      | 0.00      | 0.00 E5     |
| 92Y10    | 1.00      | 1.00      | 0.00      | 1.00 E4     |
| 92Y10    | 0.00      | 0.00      | 0.00      | 0.00 E3     |
| 94B10    | 1.00      | 1.00      | 0.00      | 1.00 E4     |
| OFFICER  | 5.00      | 5.00      | 0.00      | 5.00        |
| WARRANT  | 0.00      | 0.00      | 0.00      | 0.00        |
| ENLISTED | 97.00     | 99.00     | 2.00      | 99.00       |
| TOTAL    | 102.00    | 104.00    | 2.00      | 104.00      |

TABLE H-6

## FRACTIONAL MANPOWER REQUIREMENTS FOR DS AND GS MAINT DEMAND

## DS NPR BY NOS

|     |        |
|-----|--------|
| 27E | 0.8131 |
| 27U | 0.0000 |
| 29E | 0.1086 |
| 29J | 0.0103 |
| 29N | 0.0550 |
| 29S | 0.0007 |
| 35H | 0.0460 |
| 39E | 0.1507 |
| 43H | 0.0000 |
| 44B | 0.0033 |
| 44E | 0.0008 |
| 45B | 0.0405 |
| 45G | 0.0008 |
| 52D | 0.1120 |
| 62B | 0.0209 |
| 63H | 0.1856 |
| 63J | 0.0364 |
| 63M | 0.9631 |

## GS NPR BY NOS

|     |        |
|-----|--------|
| 27E | 0.5087 |
| 27U | 0.0000 |
| 29E | 0.0447 |
| 29N | 0.0115 |
| 29S | 0.0018 |
| 35H | 0.0762 |
| 39B | 0.0016 |
| 39E | 0.0417 |
| 44B | 0.0017 |
| 44E | 0.0000 |
| 45B | 0.0102 |
| 45G | 0.0036 |
| 52D | 0.0660 |
| 62B | 0.0069 |
| 63H | 0.0000 |
| 63J | 0.0310 |
| 63M | 0.6566 |

TABLE H-7

## 11C POSITIONS BY PARAGRAPH DTOE

| PARA | FUNCTIONAL AREA | E8 | E7 | E6 | E5 | E4 | E3 | TOTAL |
|------|-----------------|----|----|----|----|----|----|-------|
| 101  | HQ SECTION      | 1  |    |    |    |    | 2  | 3     |
| 103  | PLATOON HQ      | 2  | 0  | 0  | 0  | 0  | 2  | 4     |
| 104  | MORTAR SECTION  |    | 4  | 4  | 4  | 0  | 4  | 16    |
| 105  | MORTAR SQUAD    |    | 0  | 0  | 12 | 24 | 24 | 60    |
|      | LRSM CO TOTAL   | 3  | 4  | 4  | 16 | 24 | 32 | 83    |

## 11C POSITIONS BY PARAGRAPH PROJECTION

| PARA | FUNCTIONAL AREA | E8 | E7 | E6 | E5 | E4 | E3 | TOTAL |
|------|-----------------|----|----|----|----|----|----|-------|
| 101  | HQ SECTION      | 1  |    |    |    |    | 2  | 3     |
| 103  | PLATOON HQ      | 2  | 0  | 0  | 0  | 0  | 2  | 4     |
| 104  | MORTAR SECTION  |    | 4  | 4  | 4  | 0  | 4  | 16    |
| 105  | MORTAR SQUAD    |    | 0  | 0  | 12 | 24 | 24 | 60    |
|      | LRSM CO TOTAL   | 3  | 4  | 4  | 16 | 24 | 32 | 83    |

|                   |   |   |   |    |    |    |    |
|-------------------|---|---|---|----|----|----|----|
| BATTALION TOTAL   | 3 | 4 | 4 | 16 | 24 | 32 | 83 |
| NON SYSTEM DRIVEN | 3 | 4 | 4 | 4  | 0  | 8  | 23 |
| SYSTEM DRIVEN     | 0 | 0 | 0 | 12 | 24 | 24 | 60 |

TABLE H-8

## EQUIPMENT SECTION WLOS-CA CO LIGHT DIVISION LRSN

| LIN      | NOMENCLATURE                                    | QTY<br>REQ |
|----------|---|------------|
| A22496   | AIMING CIRCLE                                   | 4          |
| A32353   | ALARM CHEM AGENT                                | 5          |
| A56243   | ANALYZER SET ENGINE                             | 1          |
| A79381   | ANTENNA GROUP OE-254()/GRC                      | 11         |
| A79449   | ANTENNA GROUP OE-303/GRC                        | 1          |
| C05541   | CONTROL REC TRANS: C-11561(C)/U                 | 3          |
| C05701   | MONITOR CHEM AGENT                              | 2          |
| C10990   | CARRIER 120MM MORTAR                            | 0          |
| C10990 * |   | 0          |
| C10990 * |   | 0          |
| C18234   | CARRIER PERS FULL TRKED ARMD (RISE)             | 0          |
| C18234 * |   | 0          |
| C18234 * |   | 0          |
| C60294   | COMPUTER SET BALLISTICS: MORTAR M23             | 8          |
| C62375   | BATTERY CASE: Z-A1J-E1                          | 3          |
| D11538   | CARRIER COMMAND POST: LT TRACKED                | 0          |
| D11538 * |   | 0          |
| D11538 * |   | 0          |
| D11538 * |   | 0          |
| D99573   | CHARGER BATTERY: PP-34/MSM                      | 1          |
| E00533   | CHARGER RADIAC DETECT                           | 5          |
| E36896   | CMBT VEH ANTI TANK: IMP TOM W/O TOM MPN SYS     | 0          |
| E63728   | COMPASS MAGNETIC UNMTD                          | 16         |
| E70064   | COMP UNIT RCP TRK 2 WHL PNEU TIRE GAS DRVN      | 1          |
| E98103   | ELEC TRANSFER KEY KYK-13/TSEC                   | 3          |
| F55553   | DISTRIBUTION SYS ELEC 120V 1PH 60AMP            | 1          |
| G11966   | GEN SET DED SKID MTD 5KW 60HZ                   | 1          |
| G18358   | GEN SET DED SKID MTD 3KW                        | 1          |
| H25866   | HEATER RATION INDIV: MTD TRPS                   | 18         |
| J31297   | INST KIT MK-2195/VRC-87/88/90 2 1/2 5 TON       | 1          |
| J31569   | INSTL KIT 87.88,90 HHMW                         | 1          |
| J47151   | INST KIT 87.88,89 H987,984,988                  | 0          |
| J47457   | INSTL KIT 89.91,92 HHMW                         | 7          |
| J87848   | INSTL KIT MK-2499/VRC FOR TSEC/KY-57 WITH SINCS | 0          |
| K23814   | HEADSET-MICROPHONE: H-182/PT                    | 12         |
| L44595   | LAUNCHER GRENADE 40MM: SBL SHOT RIFLE MTD DTCH  | 0          |
| L44748   | LAUNCHER GRENADE ARMAMENT SUBSYSTEM             | 0          |
| L63994   | LIGHT SET GEN ILLUM 25 OUTLET                   | 2          |
| L67021   | LAUNCHER GRENADE SMOKE                          | 0          |
| L91975   | MACHINE GUN CALIBER .50                         | 13         |
| L92386   | MACHINE GUN 7.62MM                              | 1          |
| M09009   | MACHINE GUN 5.56MM                              | 4          |
| M12418   | MASK CBR M40                                    | 104        |
| M14381   | MASK AG-903/B                                   | 8          |
| M18526   | MASK CBR CMBT VEH M42                           | 0          |
| M60449   | MULTIMETER DIGITAL AM/PSM-45                    | 4          |
| M68405   | MORTAR 120 MM                                   | 12         |
| M68405 * |   | 12         |
| M74364   | MOUNT GUN RING CAL .50                          | 1          |
| M75577   | MOUNT TRIPOD MACH GUN HUY CAL .50               | 13         |
| M75714   | MOUNT TRIPOD MACH GUN 7.62 MM                   | 5          |
| M02758   | NET CONTROL DEVICE                              | 4          |

TABLE H-8 (CON'T)

|          |  |    |
|----------|--|----|
| N04596   | NIGHT VISION SIGHT CREW SERVED WEAPON AM/TVS-5 | 13 |
| N04732   | NIGHT VISION SIGHT INDIV SERVD WPN AM/PVS-4    | 9  |
| N05050   | NIGHT VISION SIGHT SET AM/UAS-11               | 0  |
| N05482   | NIGHT VISION GOOGLES AM/PVS-7B                 | 61 |
| P07900   | PLOTTING BOARD INDIRECT FIRE AZIMUTH           | 20 |
| P40750   | POWER SUPPLY PP-6224/U                         | 4  |
| P70517   | PURGING KIT FIRE CONTROL: ORG MAINT            | 1  |
| P98152   | PISTOL 9MM AUTOMATIC: M9                       | 15 |
| Q20935   | RADIAC METER IM-93/UD                          | 8  |
| R20684   | RADIAC SET AM/VDR-2                            | 5  |
| R30895   | RADIO SET AM/8RC 213                           | 0  |
| R30925   | RADIAC SET AM/PDR-75                           | 1  |
| R67194   | RADIO SET AM/VRC-87A                           | 8  |
| R67194   | RADIO SET AM/VRC-88A                           | 12 |
| R68010   | RADIO SET AM/VRC-91A                           | 0  |
| R67908   | RADIO SET AM/VRC-90A                           | 3  |
| R45339   | RADIO SET AM/VRC-92                            | 12 |
| R55268   | RADIO SET AM/PRC-119                           | 3  |
| R56742   | REEL EQUIPMENT CE-11                           | 5  |
| R59160   | REELING MACHINE CABLE                          | 9  |
| R93169   | RADIO TEST SET AM/PRM-34                       | 1  |
| R95035   | RIFLE 5.56 MM M16A2                            | 89 |
| R97234   | RIFLE 5.56 MM M4                               | 0  |
| S01373   | SPEECH SECURITY EQUIP TSEC/KY-57               | 1  |
| T07679   | TRK UTIL HVY VARIANT HMMV                      | 12 |
| T25726   | TONE-SIGNALING ADAPTER TA-977                  | 1  |
| T39518   | TRK CGO TACT 8X8 HEMMT W/W W/LT CRANE          | 3  |
| T40405   | TAPE READER GP KD1-18/TSEC                     | 2  |
| T45593   | SIGHT BORE OPTICAL                             | 4  |
| T61494   | TRUCK UTIL: CGO/TRP M998 HMMV                  | 8  |
| T63093   | TRUCK WRKR TAC 8X8 HEMMT W/W W/LT CRANE        | 0  |
| T87243   | TRUCK TANK FUEL SVC6 2500 GAL HEMMT            | 0  |
| T87243 * |  | 0  |
| T92242   | TRK UTIL ARMT CARRIER HMMV                     | 12 |
| U82529   | SWITCHBOARD TELEPHONE MANUAL: SB-993/8T        | 4  |
| U81707   | SWITCHBOARD TELEPHONE MANUAL: SB-22/PT         | 1  |
| U89185   | UTILITY RECEPTACLE                             | 1  |
| V31211   | TELEPHONE SET TA312                            | 26 |
| V98788   | POWER SUPPLY VEN HYP-57/TSEC                   | 2  |
| W32593   | SHOP EQUIP AUTO MAINT                          | 1  |
| W32867   |  | 1  |
| W65747   | TOOL SET VEH FULL TRACKED                      | 1  |
| W95537   | TLR CGO 3/4 TON 2 WNL W/E                      | 0  |
| W95537 * |  | 0  |
| W95811   | TLR CGO 1 1/2T M105                            | 0  |
| W95811 * |  | 0  |
| W98825   | TLR TANK WATER 400 GAL M149A2                  | 1  |
| X40794   | TRUCK CARGO DROP SIDE 6X6 W/E M923A1           | 0  |
| X40831   | TRUCK CARGO 5 TON 6X6 LWB W/E                  | 0  |
| Z40430   | TRUCK CGO LMTV W/E                             | 4  |
| Z09000   | LOGNARS(T) COMM NODEN GRP                      | 1  |
| Z25291   | ELECTRONIC NOTEBOOK (EN): AM/CYZ-7             | 22 |

TABLE H-8 (CON'T)

|          |                                 |   |
|----------|---------------------------------|---|
| 228175   | GM SYS FIBER OPTICS-IT: NLOS-CA | 0 |
| 228175*  |                                 | 0 |
| 232890   | HEATER DUCT TYPE PTBL           | 1 |
| 232890 * |                                 | 1 |
| 236068   | TRLR CGO LMTV W/DROPSIDES       | 3 |
| 236272   | TRLR CGO HIGH MOBILITY          | 1 |
| 237833   | TRMR MISSILE ASMBLY MASS SIM    | 0 |
| 243350   | MISSILE GUIDED FIBER OPTICS     | 0 |
| 250144   | LOGMARS(IT) MICROPRO GRP        | 1 |
| 262381   | RECOVERY VEHICLE FULL TRACKED   | 0 |
| 262381 * |                                 | 1 |
| 262381 * |                                 | 1 |
| 262381 * |                                 | 1 |
| 262381 * |                                 | 1 |
| 262381 * |                                 | 1 |
| 267950   | MOUNT TRIPOD MACH GUN XM192     | 1 |
| 294047   | TRUCK TANK POL MTV W/E          | 1 |
| 294047 * |                                 | 1 |
| 294433   | TRUCK WRECKER MTV W/W W/E       | 1 |
| 295931   | VEHICLE POWER CONDITIONER (VPC) | 1 |

TABLE H-9

## UNIT MANPOWER REQUIREMENTS NLOS-CA CO HEAVY DIVISION FOG-M

| MOS      | DTOE                | PROJECTED           | DELTA                | MLOS CO<br>FOGM HWY GRADE |
|----------|---------------------|---------------------|----------------------|---------------------------|
|          | NLOS CO<br>FOGM HWY | NLOS CO<br>FOGM HWY | DTOE VS<br>PROJECTED |                           |
| 11A00    | 0.00                | 0.00                | 0.00                 | 0.00 05                   |
| 11A00    | 0.00                | 0.00                | 0.00                 | 0.00 04                   |
| 11A00    | 1.00                | 1.00                | 0.00                 | 1.00 03                   |
| 11A00    | 4.00                | 4.00                | 0.00                 | 4.00 02                   |
| 11H5M    | 1.00                | 1.00                | 0.00                 | 1.00 E8                   |
| 11H40    | 4.00                | 4.00                | 0.00                 | 4.00 E7                   |
| 11H30    | 7.00                | 4.00                | -3.00                | 4.00 E6                   |
| 11H20    | 6.00                | 9.00                | 3.00                 | 9.00 E5                   |
| 11H10    | 12.00               | 14.00               | 2.00                 | 14.00 E4                  |
| 11H10    | 11.00               | 9.00                | -2.00                | 9.00 E3                   |
| 24N10    | 0.00                | 1.00                | 1.00                 | 1.00 E4                   |
| 24N10    | 0.00                | 0.00                | 0.00                 | 0.00 E3                   |
| 31U30    | 0.00                | 0.00                | 0.00                 | 0.00 E6                   |
| 31U20    | 1.00                | 0.00                | -1.00                | 0.00 E5                   |
| 31U10    | 0.00                | 1.00                | 1.00                 | 1.00 E4                   |
| 52D10    | 0.00                | 1.00                | 1.00                 | 1.00 E4                   |
| 54B20    | 1.00                | 1.00                | 0.00                 | 1.00 E5                   |
| 54B10    | 0.00                | 0.00                | 0.00                 | 0.00 E4                   |
| 63B20    | 0.00                | 1.00                | 1.00                 | 1.00 E5                   |
| 63B10    | 0.00                | 0.00                | 0.00                 | 0.00 E4                   |
| 63B10    | 0.00                | 1.00                | 1.00                 | 1.00 E3                   |
| 63J20    | 0.00                | 0.00                | 0.00                 | 0.00 E5                   |
| 63J10    | 0.00                | 1.00                | 1.00                 | 1.00 E4                   |
| 63J10    | 0.00                | 0.00                | 0.00                 | 0.00 E3                   |
| 63S20    | 0.00                | 0.00                | 0.00                 | 0.00 E5                   |
| 63S10    | 0.00                | 1.00                | 1.00                 | 1.00 E4                   |
| 63S10    | 0.00                | 0.00                | 0.00                 | 0.00 E3                   |
| 77F20    | 0.00                | 0.00                | 0.00                 | 0.00 E5                   |
| 77F10    | 1.00                | 1.00                | 0.00                 | 1.00 E4                   |
| 77F10    | 1.00                | 1.00                | 0.00                 | 1.00 E3                   |
| 88M30    | 0.00                | 0.00                | 0.00                 | 0.00 E6                   |
| 88M20    | 1.00                | 1.00                | 0.00                 | 1.00 E5                   |
| 88M10    | 2.00                | 1.00                | -1.00                | 1.00 E4                   |
| 88M10    | 2.00                | 0.00                | -2.00                | 0.00 E3                   |
| 92A10    | 0.00                | 0.00                | 0.00                 | 0.00 E4                   |
| 92A10    | 0.00                | 1.00                | 1.00                 | 1.00 E3                   |
| 92Y30    | 0.00                | 0.00                | 0.00                 | 0.00 E6                   |
| 92Y20    | 1.00                | 1.00                | 0.00                 | 1.00 E5                   |
| 92Y10    | 1.00                | 1.00                | 0.00                 | 1.00 E4                   |
| 92Y10    | 0.00                | 0.00                | 0.00                 | 0.00 E3                   |
| OFFICER  | 5.00                | 5.00                | 0.00                 | 5.00                      |
| WARRANT  | 0.00                | 0.00                | 0.00                 | 0.00                      |
| ENLISTED | 52.00               | 56.00               | 4.00                 | 56.00                     |
| TOTAL    | 57.00               | 61.00               | 4.00                 | 61.00                     |

TABLE H-10

MANPOWER REQUIREMENTS FOR MOSC 63B, 63S, 92A ARE DISPLAYED TO SHOW WHOLE MANPOME MAINTENANCE DEMAND IF ORGANIC VEHICLES ARE MAINTAINED AT THE UNIT LEVEL.

MANPOWER REQUIREMENTS FOR WHEELED VEHICLE MAINTENANCE IF PERFORMED AT A SUPPORTING ORGANIZATIONAL MAINTENANCE COMPANY

| MOS | MANPOWER REQUIREMENTS                   |
|-----|---|
| 63B | 1.56 FRACTIONAL BASED ON TOTAL WORKLOAD |
| 63S | 0.43 FRACTIONAL BASED ON TOTAL WORKLOAD |
| 92A | 1.00                                    |

FRACTIONAL MANPOWER REQUIREMENTS FOR DS AND GS MAINT DEMAND  
DS MAINT MPR REQ

|     |         |
|-----|---------|
| 27U | 0.59139 |
| 29E | 0.06378 |
| 29N | 0.01076 |
| 29J | 0.00753 |
| 29S | 0.00036 |
| 35H | 0.03682 |
| 39E | 0.07364 |
| 45B | 0.03562 |
| 52D | 0.03368 |
| 63J | 0.02510 |
| 63W | 2.04328 |

GS MAINT MPR REQ

|       |         |
|-------|---------|
| 27U   | 0.09156 |
| 29E   | 0.01430 |
| 29N   | 0.00170 |
| 29S67 | 0.00017 |
| 35H   | 0.06668 |
| 39B   | 0.00057 |
| 39E   | 0.00828 |
| 45B   | 0.00363 |
| 52D   | 0.01889 |
| 63J   | 0.00692 |
| 63W   | 0.66400 |

TABLE H-11

## 11H POSITIONS BY PARAGRAPH DTOE

| PARA | FUNCTIONAL AREA | E8 | E7 | E6 | E5 | E4 | E3 | TOTAL |
|------|-----------------|----|----|----|----|----|----|-------|
| 101  | HQ SECTION      | 1  | 1  | 1  | 0  | 2  | 0  | 5     |
| 104  | PLATOON HQ      |    | 3  | 0  | 0  | 0  | 9  | 12    |
| 105  | NLOS SECTIONS   |    | 0  | 6  | 6  | 12 | 0  | 24    |
|      | NLOS CO TOTAL   | 1  | 4  | 7  | 6  | 14 | 9  | 41    |

## 11H POSITIONS BY PARAGRAPH PROJECTED

| PARA | FUNCTIONAL AREA   | E8 | E7 | E6 | E5 | E4 | E3 | TOTAL |
|------|-------------------|----|----|----|----|----|----|-------|
| 101  | HQ SECTION        | 1  | 1  | 1  | 0  | 2  | 0  | 5     |
| 104  | PLATOON HQ        |    | 3  | 0  | 0  | 0  | 9  | 12    |
| 105  | NLOS SECTIONS     |    | 0  | 3  | 9  | 12 | 0  | 24    |
|      | NLOS CO TOTAL     | 1  | 4  | 4  | 9  | 14 | 9  | 41    |
|      | NLOS CO TOTAL     | 1  | 4  | 4  | 9  | 14 | 9  | 41    |
|      | NON SYSTEM DRIVEN | 1  | 4  | 1  | 0  | 2  | 9  | 17    |
|      | SYSTEM DRIVEN     | 0  | 0  | 3  | 9  | 12 | 0  | 24    |

TABLE M-12

## EQUIPMENT SECTION MLOS-CA CO HEAVY DIVISION FOB-M

| LIN      | NOMENCLATURE                              | NEW<br>REQ |
|----------|---|------------|
| A32335   | ALARM CHEN AGENT                          | 4          |
| A79381   | ANTENNA GROUP DE-254(I)/GRC               | 5          |
| C05541   | CONTROL REC TRANS: C-11561(C)/U           | 2          |
| C05701   | MONITOR CHEN AGENT                        | 2          |
| C62375   | BATTERY CASE: Z-AIJ-EI                    | 12         |
| E00533   | CHARGER RADIAC DETECT                     | 4          |
| E98103   | ELEC TRANSFER KEY KYK-13/TSEC             | 1          |
| G18358   | GEN SET DED SKID MTD 3KW                  | 1          |
| J31297   | INST KIT MK-2195/VRC-87/88/90 2 1/2 5 TON | 1          |
| J31569   | INSTL KIT 87,88,90 HMMWV                  | 13         |
| J47151   | INST KIT 87,88,89 M987,984,988            | 0          |
| J47457   | INSTL KIT 89,91,92 HMMWV                  | 16         |
| L92386   | MACHINE GUN 7.62MM                        | 2          |
| M12418   | MASK CBR                                  | 56         |
| M75714   | MOUNT TRIPOD                              | 2          |
| N02758   | NET CONTROL DEVICE                        | 2          |
| N04732   | NIGHT VISION GOGGLES AN/PVS-4             | 2          |
| N05482   | NIGHT VISION GOGGLES AN/PVS-7B            | 45         |
| P98152   | PISTOL 9MM AUTOMATIC: M9                  | 13         |
| Q20935   | RADIACMETER IN-93/UD                      |            |
| R20684   | RADIAC SET AN/VDR-2                       | 4          |
| R30895   | RADIO SET AN/GRC 213                      | 0          |
| R30923   | RADIAC SET AN/PDR-75                      | 1          |
| R44659   | RADIO SET AN/VRC-87                       | 0          |
| R67194   | RADIO SET AN/VRC-88A                      | 12         |
| R68010   | RADIO SET AN/VRC-91A                      | 3          |
| R67908   | RADIO SET AN/VRC-90A                      | 2          |
| R45407   | RADIO SET AN/VRC-92A                      | 1          |
| R56742   | REEL EQUIPMENT CE-11                      | 15         |
| R59160   | REELING MACHINE CABLE                     | 8          |
| R95035   | RIFLE 5.56 MM M16A2                       | 56         |
| R97234   | RIFLE 5.56 MM M4                          | 0          |
| T07679   | TRK UTIL HVY VARIANT HMMWV                | 12         |
| T39518   | TRK CGO TACT 8X8 HEMMT W/W W/LT CRANE     | 3          |
| T40405   | TAPE READER SP K01-18/TSEC                | 1          |
| T61494   | TRUCK UTIL: CGO/TRP M998 HMMWV            | 5          |
| T63093   | TRUCK WRKR TAC 8X8 HEMMT W/W W/LT CRANE   | 1          |
| T87243   | TRUCK TANK FUEL SVCS 2500 GAL HEMMT       | 1          |
| T87243 * |   | 1          |
| T92242   | TRK UTIL ARMT CARRIER HMMWV               | 12         |
| V31211   | TELEPHONE SET TA312                       | 6          |
| W95811   | TRLR CGO 1 1/2T M105                      | 0          |
| W95811 * |   |            |
| W98825   | TRLR TANK WATER 400 GAL M149A2            | 1          |
| X40794   | TRUCK CARGO DROP SIDE 6X6 W/E M923A1      | 0          |
| X40831   | TRUCK CARGO 5 TON 6X6 LWB W/E             | 0          |
| Z40430   | TRUCK CGO LMTV W/E                        | 1          |
| Z25291   | ELECTRONIC NOTEBOOK (EN): AN/CYZ-7        | 18         |
| Z28175   | GM SYS FIBER OPTICS-IT: MLOS-CA           | 12         |
| Z28175*  |   | 12         |
| Z37833   | TRMR MISSILE ASMBLY MASS SIM              | 72         |
| Z43350   | MISSILE GUIDED FIBER OPTICS               | 12         |
| Z95931   | VEHICLE POWER CONDITIONER (VPC)           | 12         |

TABLE H-13

## UNIT MANPOWER REQUIREMENTS NLOS-CA CO LIGHT DIVISION FOG-N

|          | DTOE<br>NLOS CO<br>FOGM LT | PROJECTED<br>NLOS CO<br>FOGM LT | DELTA<br>DTOE VS<br>PROJECTED | NLOS CO<br>FOGM LT GRADE |
|----------|----------------------------|---------------------------------|-------------------------------|--------------------------|
| NOS      |                            |                                 |                               |                          |
| 11A00    | 0.00                       | 0.00                            | 0.00                          | 0.00 03                  |
| 11A00    | 0.00                       | 0.00                            | 0.00                          | 0.00 04                  |
| 11A00    | 1.00                       | 1.00                            | 0.00                          | 1.00 03                  |
| 11A00    | 4.00                       | 4.00                            | 0.00                          | 4.00 02                  |
| 11H5H    | 1.00                       | 1.00                            | 0.00                          | 1.00 E8                  |
| 11H4D    | 4.00                       | 4.00                            | 0.00                          | 4.00 E7                  |
| 11H3D    | 7.00                       | 4.00                            | -3.00                         | 4.00 E6                  |
| 11H2D    | 6.00                       | 9.00                            | 3.00                          | 9.00 E5                  |
| 11H1D    | 12.00                      | 14.00                           | 2.00                          | 14.00 E4                 |
| 11H1D    | 11.00                      | 9.00                            | -2.00                         | 9.00 E3                  |
| 24N1D    | 0.00                       | 1.00                            | 1.00                          | 1.00 E4                  |
| 24N1D    | 0.00                       | 0.00                            | 0.00                          | 0.00 E3                  |
| 31U3D    | 0.00                       | 0.00                            | 0.00                          | 0.00 E6                  |
| 31U2D    | 1.00                       | 0.00                            | -1.00                         | 0.00 E3                  |
| 31U1D    | 0.00                       | 1.00                            | 1.00                          | 1.00 E4                  |
| 52D1D    | 0.00                       | 1.00                            | 1.00                          | 1.00 E4                  |
| 54B2D    | 1.00                       | 1.00                            | 0.00                          | 1.00 E5                  |
| 54B1D    | 0.00                       | 0.00                            | 0.00                          | 0.00 E4                  |
| 63B2D    | 0.00                       | 1.00                            | 1.00                          | 1.00 E5                  |
| 63B1D    | 0.00                       | 0.00                            | 0.00                          | 0.00 E4                  |
| 63B1D    | 0.00                       | 1.00                            | 1.00                          | 1.00 E3                  |
| 63J2D    | 0.00                       | 0.00                            | 0.00                          | 0.00 E5                  |
| 63J1D    | 0.00                       | 1.00                            | 1.00                          | 1.00 E4                  |
| 63J1D    | 0.00                       | 0.00                            | 0.00                          | 0.00 E3                  |
| 63S2D    | 0.00                       | 0.00                            | 0.00                          | 0.00 E5                  |
| 63S1D    | 0.00                       | 1.00                            | 1.00                          | 1.00 E4                  |
| 63S1D    | 0.00                       | 0.00                            | 0.00                          | 0.00 E3                  |
| 77F2D    | 0.00                       | 0.00                            | 0.00                          | 0.00 E5                  |
| 77F1D    | 1.00                       | 0.00                            | -1.00                         | 0.00 E4                  |
| 77F1D    | 1.00                       | 1.00                            | 0.00                          | 1.00 E3                  |
| 88M3D    | 0.00                       | 0.00                            | 0.00                          | 0.00 E6                  |
| 88M2D    | 1.00                       | 1.00                            | 0.00                          | 1.00 E5                  |
| 88M1D    | 2.00                       | 1.00                            | -1.00                         | 1.00 E4                  |
| 88M1D    | 2.00                       | 0.00                            | -2.00                         | 0.00 E3                  |
| 92A1D    | 0.00                       | 0.00                            | 0.00                          | 0.00 E4                  |
| 92A1D    | 0.00                       | 1.00                            | 1.00                          | 1.00 E3                  |
| 92Y3D    | 0.00                       | 0.00                            | 0.00                          | 0.00 E6                  |
| 92Y2D    | 1.00                       | 1.00                            | 0.00                          | 1.00 E5                  |
| 92Y1D    | 1.00                       | 1.00                            | 0.00                          | 1.00 E4                  |
| 92Y1D    | 0.00                       | 0.00                            | 0.00                          | 0.00 E3                  |
| OFFICER  | 5.00                       | 5.00                            | 0.00                          | 5.00                     |
| WARRANT  | 0.00                       | 0.00                            | 0.00                          | 0.00                     |
| ENLISTED | 52.00                      | 55.00                           | 3.00                          | 55.00                    |
| TOTAL    | 57.00                      | 60.00                           | 3.00                          | 60.00                    |

TABLE H-14

MANPOWER REQUIREMENTS FOR MOSC 63B, 63S, 92A ARE DISPLAYED TO SHOW WHOLE MANPOWER MAINTENANCE DEMAND IF ORGANIC VEHICLES ARE MAINTAINED AT THE UNIT LEVEL.

MANPOWER REQUIREMENTS FOR WHEELED VEHICLE MAINTENANCE IF PERFORMED AT A SUPPORTING ORGANIZATIONAL MAINTENANCE COMPANY

| MOS | MANPOWER REQUIREMENTS                   |
|-----|---|
| 63B | 1.56 FRACTIONAL BASED ON TOTAL WORKLOAD |
| 63S | 0.43 FRACTIONAL BASED ON TOTAL WORKLOAD |
| 92A | 1.00                                    |

FRACTIONAL MANPOWER REQUIREMENTS FOR DS AND GS MAINT DEMAND  
DS MAINT MPR REQ

|     |         |
|-----|---------|
| 27U | 0.59139 |
| 29E | 0.06378 |
| 29N | 0.01076 |
| 29J | 0.00753 |
| 29S | 0.00036 |
| 35H | 0.03682 |
| 39E | 0.07364 |
| 45B | 0.03562 |
| 52D | 0.03368 |
| 63J | 0.02510 |
| 63M | 2.04328 |

GS MAINT MPR REQ

|       |         |
|-------|---------|
| 27U   | 0.09156 |
| 29E   | 0.01430 |
| 29N   | 0.00170 |
| 29S67 | 0.00017 |
| 35H   | 0.06668 |
| 39B   | 0.00057 |
| 39E   | 0.00828 |
| 45B   | 0.00363 |
| 52D   | 0.01889 |
| 63J   | 0.00692 |
| 63M   | 0.66400 |

TABLE H-15

## 11H POSITIONS BY PARAGRAPH DTCE

| PARA | FUNCTIONAL AREA | E8 | E7 | E6 | E5 | E4 | E3 | TOTA |
|------|-----------------|----|----|----|----|----|----|------|
| 101  | HQ SECTION      | 1  | 1  | 1  | 0  | 2  | 0  | 5    |
| 104  | PLATOON HQ      |    | 3  | 0  | 0  | 0  | 9  | 12   |
| 105  | NLOS SECTIONS   |    | 0  | 6  | 6  | 12 | 0  | 24   |
|      | NLOS CO TOTAL   | 1  | 4  | 7  | 6  | 14 | 9  | 41   |

## 11H POSITIONS BY PARAGRAPH PROJECTED

| PARA | FUNCTIONAL AREA   | E8 | E7 | E6 | E5 | E4 | E3 | TOTA |
|------|-------------------|----|----|----|----|----|----|------|
| 101  | HQ SECTION        | 1  | 1  | 1  | 0  | 2  | 0  | 5    |
| 104  | PLATOON HQ        |    | 3  | 0  | 0  | 0  | 9  | 12   |
| 105  | NLOS SECTIONS     |    | 0  | 3  | 9  | 12 | 0  | 24   |
|      | NLOS CO TOTAL     | 1  | 4  | 4  | 9  | 14 | 9  | 41   |
|      | NLOS CO TOTAL     | 1  | 4  | 4  | 9  | 14 | 9  | 41   |
|      | NON SYSTEM DRIVEN | 1  | 4  | 1  | 0  | 2  | 9  | 17   |
|      | SYSTEM DRIVEN     | 0  | 0  | 3  | 9  | 12 | 0  | 24   |

TABLE H-16

## EQUIPMENT SECTION NLOS-CA CO LIGHT DIVISION FOB-M

| LIN      | NOMENCLATURE                              | MEM<br>REQ |
|----------|---|------------|
| A32355   | ALARM CHEN AGENT                          | 4          |
| A79381   | ANTENNA GROUP DE-254(1)/BRC               | 5          |
| C05541   | CONTROL REC TRANS: C-11561(C)/U           | 2          |
| C05701   | MONITOR CHEN AGENT                        | 2          |
| C62375   | BATTERY CASE: Z-AIJ-EI                    | 12         |
| E00533   | CHARGER RADIAC DETECT                     | 4          |
| E98103   | ELEC TRANSFER KEY KYK-13/TSEC             | 1          |
| 618358   | GEN SET DEB SKID MTD 3KW                  | 1          |
| J31297   | INST KIT MK-2195/VRC-87/88/90 2 1/2 5 TON | 1          |
| J31569   | INSTL KIT 87.88.90 HMMWV                  | 13         |
| J47151   | INST KIT 87.88.89 M987,984,988            | 0          |
| J47457   | INSTL KIT 89.91.92 HMMWV                  | 16         |
| L92386   | MACHINE GUN 7.62MM                        | 2          |
| M12418   | MASK CBR                                  | 56         |
| M75714   | MOUNT TRIPOD                              | 2          |
| N02758   | NET CONTROL DEVICE                        | 2          |
| N04732   | NIGHT VISION GOGGLES AM/PVS-4             | 2          |
| N05482   | NIGHT VISION GOGGLES AM/PVS-7B            | 45         |
| P98152   | PISTOL 9MM AUTOMATIC: M9                  | 13         |
| Q20935   | RADIACMETER IN-93/UD                      |            |
| R20684   | RADIAC SET AM/VDR-2                       | 4          |
| R30895   | RADIO SET AM/BRC 213                      | 0          |
| R30925   | RADIAC SET AM/PDR-75                      | 1          |
| R44659   | RADIO SET AM/VRC-87                       | 0          |
| R67194   | RADIO SET AM/VRC-88A                      | 12         |
| R68010   | RADIO SET AM/VRC-91A                      | 3          |
| R67908   | RADIO SET AM/VRC-90A                      | 2          |
| R45407   | RADIO SET AM/VRC-92A                      | 1          |
| R56742   | REEL EQUIPMENT CE-11                      | 15         |
| R59160   | REELING MACHINE CABLE                     | 8          |
| R95035   | RIFLE 5.56 MM M16A2                       | 56         |
| R97234   | RIFLE 5.56 MM M4                          | 0          |
| T07679   | TRK UTIL Hvy VARIANT HMMWV                | 12         |
| T39518   | TRK CGO TACT 8X8 HEWIT M/M M/LT CRANE     | 3          |
| T40405   | TAPE READER 6P K01-18/TSEC                | 1          |
| T61494   | TRUCK UTIL: CGO/TRP M998 HMMWV            | 5          |
| T63093   | TRUCK WRKR TAC 8X8 HEWIT M/M M/LT CRANE   | 1          |
| T87243   | TRUCK TANK FUEL SVCS 2500 GAL HEWIT       | 1          |
| T87243 * |   | 1          |
| T92242   | TRK UTIL ARMT CARRIER HMMWV               | 12         |
| V31211   | TELEPHONE SET TAS12                       | 6          |
| W95811   | TLR CGO 1 1/2T M105                       | 0          |
| W95811 * |   |            |
| W98825   | TLR TANK WATER 400 GAL M149A2             | 1          |
| X40794   | TRUCK CARGO DROP SIDE 6X6 M/E M923A1      | 0          |
| X40831   | TRUCK CARGO 5 TON 6X6 LMB M/E             | 0          |
| X40430   | TRUCK CGO LHTV M/E                        | 1          |
| Z25291   | ELECTRONIC NOTEBOOK (EN): AM/CYZ-7        | 18         |
| Z28175   | GM SYS FIBER OPTICS-IT: NLOS-CA           | 12         |
| Z28175*  |   | 12         |
| Z37833   | TMR MISSILE ASMBLY MASS SIM               | 72         |
| Z43350   | MISSILE GUIDED FIBER OPTICS               | 12         |
| Z95931   | VEHICLE POWER CONDITIONER (VPC)           | 12         |

**APPENDIX I**  
**NLOS-CA PERSONNEL ASSESSMENT**

## 1.0 PERSONNEL ASSESSMENT.

As a part of the Manpower/Personnel Analysis effort, the AEPCO/DRC team was asked to provide a high level assessment of the whether or not MOS 11H has the physical attributes and the prerequisite skills and knowledge to learn to operate the NLOS-CA console.

**1.1 SCOPE.** The assessment was limited to the NLOS-CA console operation and was based upon the information available from the Target Audience Description (TAD) for MOS 11H and 96H.

## 1.2 ASSUMPTIONS.

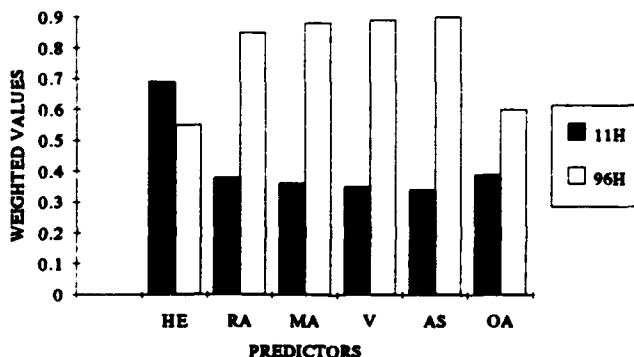
MOS 11H will be the NLOS-CA operator;

MOS 96H performs tasks similar to those required for operation of the NLOS-CA console;

The current TADs for MOS 11H and 96H are accurate; and

The NLOS-CA console will include full color displays.

**1.3 RESULTS.** Based upon the comparison of the 11H and the 96H MOS it appears that there is some risk in assuming that the current soldier in MOS 11H can operate the NLOS-CA console. The risk is primarily associated with MOS 11H having the vision requirement for red/green discrimination rather than normal color vision and to a lesser degree the ASVAB requirements. Figure 1.3-1 is a graphical representation of the relationship between the MOSs based upon the personnel predictors that were selected to be used in this assessment. The Y Axis shows the weighted value for the MOSs for each predictor. The utility of this graph is not to determine the score of the MOSs, but to show the difference between them. The differences indicate those predictors where the analyst determined that the higher scoring MOS is more likely to meet or exceed the evaluation criteria. The overall score for each MOS is a computation of the predictor's score for each MOS based upon the weighted value of each predictor. A more in depth discussion of the evaluation of each predictor is provided at Attachment 1.



**FIGURE 1.3-1 COMPARISON OF PERSONNEL SUPPORT REQUIREMENTS BETWEEN 11H AND 96H MOS**

HE - HAND EYE COORDINATION  
RA - READING ABILITY  
MA - MATH ABILITY  
V - VISION  
AS - ANALYTICAL SKILLS  
OA - OVERALL SCORE

#### **1.4 METHODOLOGY.**

The assessment was conducted using the Analytical Hierarchy Process (AHP) which is discussed at Appendix G of this report. The Expert Choice (TM) software was used to implement and document the AHP. First the analyst identified the personnel predictors for the operation of the NLOS-CA console; then the analyst selected the criteria from the TAD that would be used to evaluate the relative importance of each predictor; next the analyst executed the Expert Choice (TM) model; and finally, the analyst conducted sensitivity analyses.

**1.4.1 Personnel Predictors.** The 11H MOS does not currently train specific tasks that are envisioned for the operation of the NLOS-CA console (i.e. controlling the flight of a missile). Therefore, the analyst selected the 96H MOS (Aerial Intelligence Specialist) as a base case for selecting and assessing the personnel predictors. The analyst reviewed the tasks trained for the 96H and selected those that are similar to the tasks required for the operation of the NLOS-CA console. These tasks may be found at Attachment 1. The analyst then determined the predictors for the tasks. The selection of the predictors was based upon DRC's training analysts experience in conducting training analyses and designing and developing Army training courses. Table 1.4-1 shows the personnel predictors and the reason why each criterion was selected.

**TABLE 1.4-1 PERSONNEL PREDICTORS**

| <b>PREDICTOR</b>      | <b>REASON</b>   |
|-----------------------|---|
| HAND/EYE COORDINATION | Necessary to simultaneously observe video display and adjust missile flight path  |
| READING ABILITY       | Necessary to read operating manuals and information on display screen             |
| MATHEMATICAL ABILITY  | Necessary to interpret information on display screen                              |
| VISION                | Necessary to distinguish between display screen colors and observe video display  |
| ANALYTICAL SKILLS     | Necessary to determine the correct flight path for the missile and select targets |

The analyst then determined the relative importance of each predictor, when compared to the other predictors, for the operation of the NLOS-CA console. This determination resulted in a weighted value for each predictor indicating its calculated relative importance. The predictors and their relative weighted importance are shown at Table 1.4-2.

**TABLE 1.4-2 PERSONNEL PREDICTORS AND WEIGHTED VALUES**

|                 |                 |                 |               |                 |
|-----------------|-----------------|-----------------|---------------|-----------------|
| <b>HE COORD</b> | <b>READ ABL</b> | <b>MATH ABL</b> | <b>VISION</b> | <b>ANAL SKL</b> |
| G 0.408         | G 0.145         | G 0.051         | G 0.340       | G 0.055         |

HE COORD --- Hand Eye Coordination

READ ABL --- Reading Ability

MATH ABL --- Mathematical Ability

VISION --- Visual Acuity (VA)/Normal Color (NC) Vision

ANAL SKL --- Analytical Skills

G --- GLOBAL PRIORITY: PRIORITY RELATIVE TO OVERALL TRAINABILITY OF MOS

**1.4.2 Evaluation Criteria.** Once the personnel predictors were selected, the analyst then determined the criteria for assessing each predictor. All of the criteria were selected from the TAD. The criteria selected and the reason for their selection is shown at Table 1.4-3.

**TABLE 1.4-3 EVALUATION CRITERIA**

| <b>EVALUATION CRITERION</b> | <b>REASON SELECTED</b>  |
|-----------------------------|---|
| AFQT                        | Provides Mental Categories and demonstrates abstract thinking |
| ASVAB                       | Provides Test Components                                      |
| EDU LVL                     | Provides High School and Non-High School Graduates            |
| READING LVL                 | Provides Reading Grade Level Categories                       |
| PULHES                      | Provides Physical Profile Serials                             |

AFQT - The Armed Forces Qualification Test

ASVAB - Armed Services Vocational Aptitude Battery

EDU LVL - Education Level

READING LVL - Reading Level

PULHES - P-Physical Capacity or Stamina U-Upper Extremities L-Lower Extremities H-Hearing and Ear/ E-Eyes/ S-Psychiatric

The analyst then determined the relative importance of each criterion, when compared to the other criteria, for each predictor. This determination resulted in a weighted value being calculated for each evaluation criterion indicating its impact on each predictor. A weighted value was also calculated for each criterion indicating its impact on the operation of the NLOS-CA console. Table 1.4-4 shows the personnel predictors and their relative weighted values, the percentage of impact for each evaluation criterion on its predictor, and the percentage of impact of each evaluation criteria on the overall assessment.

**TABLE 1.4-4 EVALUATION CRITERIA AND WEIGHTED IMPORTANCE**

|                                     |                                       |                                      |                                       |  |
|-------------------------------------|---------------------------------------|--------------------------------------|---------------------------------------|--|
| <b>HE COORD</b><br>G 0.408          | <b>READ ABL</b><br>G 0.145            | <b>MATH ABL</b><br>G 0.051           | <b>VISION</b><br>G 0.340              | <b>ANAL SKL</b><br>G 0.055   |
| <b>AFQT</b><br>L 0.167<br>G 0.068   | <b>READ LVL</b><br>L 0.833<br>G 0.121 | <b>ASVAB</b><br>L 0.750<br>G 0.038   | <b>NC</b><br>L 0.750<br>G 0.255       | <b>AFQT</b><br>L 0.163<br>G 0.009  |
| <b>PULHES</b><br>L 0.833<br>G 0.340 | <b>EDU LVL</b><br>L 0.167<br>G 0.024  | <b>EDU LVL</b><br>L 0.250<br>G 0.013 | <b>V/ACUTTY</b><br>L 0.250<br>G 0.085 | <b>ASVAB</b><br>L 0.540<br>G 0.030<br><b>EDU LVL</b><br>L 0.297<br>G 0.016 |

- L --- LOCAL PRIORITY: PRIORITY RELATIVE TO THE IMPORTANCE OF  
EVALUATION CRITERIA TO THE TRAINABILITY PREDICTOR
- G --- GLOBAL PRIORITY: PRIORITY RELATIVE TO OVERALL TRAINABILITY OF  
MOS

**1.4.3 Model Execution and Analysis.** After the evaluation criterion for each personnel predictor was established, the Expert Choice (TM) model was executed and a comparison of the two MOSs was produced. Once the ranking of the MOSs was established, the analyst then conducted a series of analyses to determine the sensitivity of results to changes in input criterion.

**1.5 SENSITIVITY ANALYSIS.** A sensitivity analysis was conducted by changing one or more of the evaluation criteria to determine its impact on the ranking of the alternatives.

**1.5.1 Sensitivity Analysis Methodology.** In order for the analyst to evaluate the impacts of varying the evaluation criteria, it important to determine the impacts of changing each evaluation criterion separately; the impacts of changing two of the evaluation criteria together; and finally the impacts of changing all of the evaluation criteria together. Table 1.5-1 shows the Evaluation Criteria and the reason they were selected for the analysis.

**TABLE 1.5-1 EVALUATION CRITERIA SELECTED FOR SENSITIVITY ANALYSIS**

| <b>EVALUATION CRITERION</b> | <b>REASON SELECTED</b>  |
|-----------------------------|---|
| COLOR VISION                | Critical for Interpreting Displays                            |
| VISUAL ACUTY                | Necessary for HE Coord and Viewing Display                    |
| ASVAB TEST                  | Identifies Knowledge necessary for controlling missile flight |

A discussion of the sensitivity analysis procedure and an evaluation of the results is provided at Attachment 1. The results of the analysis are shown at Table 1.5-2 and discussed in subparagraphs 1.5.1.1 through 1.5.1.7.

**TABLE 1.5-2 EVALUATION CRITERIA IMPACTS**

| <b>EVAL CRIT</b> | <b>OVERALL IMPACT*</b> |
|------------------|------------------------|
| NC               | -.13 Points            |
| VA               | -.04 Points            |
| NC/VA            | -.15 Points            |
| ASVAB            | -.04 Points            |
| ASVAB/VA         | -.08 Points            |
| ASVAB/VA/NC      | -.19 Points            |

\*At the start of the sensitivity analysis, the difference between the two MOSs was 21 points

**1.5.1.1 Color Vision.** Making normal color vision a requirement for soldiers in MOS 11H will reduce the overall difference between the 96H and 11H MOS by .13 points.

**1.5.1.2 Visual Acuity.** Making the PULHES physical serial profile requirement a 1 for eyes for soldiers in MOS 11H will reduce the overall difference between the 96H and 11H MOS by only .04 points.

**1.5.1.3 Color Vision and Visual Acuity.** If these two attributes are combined the overall difference between the 11H and 96H MOS is reduced by .15 points.

**1.5.1.4 ASVAB Test.** If the soldiers in the 11H MOS were required to have a secondary ASVAB test of ST this would reduce the overall difference between the 96H and 11H MOS by only .04 points.

**1.5.1.5 ASVAB Test and Color Vision.** If the soldiers in MOS 11H were required to have a secondary ASVAB of ST and normal color vision the difference between the 96H and 11H MOS is reduced by .16 points.

**1.5.1.6 ASVAB Test and Visual Acuity.** If the soldiers in MOS 11H were required to have a secondary ASVAB of ST and a PULHES physical serial profile requirement of 1 for eyes the difference between the 96H and 11H MOS is reduced by .08 points.

**1.5.1.7 ASVAB Tests, Normal Color, and Visual Acuity.** If the three evaluation criteria were combined the overall difference between the 96H and 11H MOS is reduced by .19 points.

**1.5.2 Sensitivity Analysis Evaluation.** Once the impacts of the changing the three evaluation criteria were determined the analyst assessed the level of the impact on

personnel qualifications and the system requirements. The impacts were assigned to one of three levels, low, medium, and high. A low level impact means that the change could be implemented with little or no disruption of the current personnel procurement system or restrictions/constraints being place upon the system design process. A medium level impact means that implementing the change could limit the current personnel procurement process or place some constraints on the system design process. A high level impact is a "show stopper", it could severely restrict the personnel procurement process or eliminate most system design alternatives. Table 1.5-3 is a matrix that shows how each of the evaluation criteria, shown at Table 1.5-1, impacts the overall difference between the 11H and 96H MOS. A discussion of the impacts of changing the normal color vision, visual acuity, and ASVAB evaluation criteria are provided in subparagraphs 1.5.2.1 through 1.5.2.3.

**TABLE 1.5-3 PERSONNEL ASSESSMENT IMPACTS**

| EVAL CRIT   | PERSONNEL<br>QUALIFICATIONS | SYSTEM<br>REQUIREMENTS |
|-------------|-----------------------------|------------------------|
| NC          | L                           | M                      |
| VA          | L/M                         | N/A                    |
| NC/VA       | L/M                         | M                      |
| ASVAB       | M                           | N/A                    |
| ASVAB/VA    | L/M                         | N/A                    |
| ASVAB/VA/NC | M                           | M                      |

Impact Categories (AS determined by DRC SMEs)

L = Low

M = Medium

N/A = Non-Applicable

**1.5.2.1 Normal Color.** The largest single benefit can be attained from requiring the soldiers in MOS 11H to have normal color vision. A low impact was assigned to this option based upon research that indicates that less than 3% of the United States (US) male population is color blind. This information was obtained from Field Circular (FC) 21-451, I Am the American Soldier, dated 31 March 1985. This would indicate the 11H personnel recruitment pool would be reduced by only 3%. The same impact can be achieved by designing the NLOS-CA displays so they can be interpreted by a soldier who is color blind. While this will provide a system that can be operated by 100% of the soldiers it may place costly and undue restrictions on the design of the displays when a maximum of 3% of the soldiers need this type of display. It should be noted that the 11H MOS may contain a larger percentage of color blind soldiers than the general population. This is due to the fact that if person is otherwise qualified for military service then he would be placed in an MOS that did not require normal color vision. However, due to the small percentage of color blind males in the US this number would still be relatively small.

**1.5.2.2 Visual Acuity.** A low to medium impact was assigned to changing this evaluation criteria because according to FC 21-451, 32% of the US male population

between the ages of 18-25 need corrective lenses. While not all of these people would fall below the visual acuity requirements for training on the NLOS-CA console it can be assumed that a certain percentage could not be correctable to within the normal vision range. This could adversely impact upon the 11H personnel recruitment pool.

**1.5.2.3 ASVAB.** A medium impact was assigned to this evaluation criteria based upon information available from data extracted from the Project A database. Project A was a major R&D effort undertaken by the Army Research Institute during the mid-1980s. Although this study is dated, it appears to be the "best accessible data" and is currently being used for other government studies. Data was not available on the 11H MOS but, there was accurate information on the 11B MOS. Since both these MOSs are from the same Consolidated Management Filed (11) and have same ASVAB test requirement (CO) and cutoff score (90), it was assumed by the analyst that the information available for the 11B for ASVAB test ST would be similar to the 11H. Based upon this data 16% of the soldiers scored below a cutoff score of 90 for the ST test. This could have an serious impact on the 11H personnel recruitment pool.

**1.6 RECOMMENDATIONS.** Based upon the personnel assessment and evaluation of the results it is recommended that the visual requirements for the soldiers in MOS 11H be changed from red/green discrimination to normal color vision. As shown at Table 5.1-3, making this change would result in the most benefit and have the least impact on the personnel requirements and no impact on the system design process.

**ATTACHMENT 1  
TO  
APPENDIX I**

**SECTION I**  
**TECHNICAL DETAILS OF ANALYSIS**

**I1-1.0 OVERVIEW.** At the NLOS-CA Delivery Order Initiation Meeting, the Government requested that a high level assessment be made to determine if MOS 11H had the prerequisite skills and knowledge to operate the NLOS-CA console. It was agreed that the analysis would be conducted with the information available from the Target Audience Description (TAD).

**I1-1.0 Personnel Predictor.** The 11H MOS does not currently train specific tasks that are envisioned for the operation of the NLOS-CA console (i.e. controlling the flight of a missile). Therefore, the analyst selected the 96H MOS (Aerial Intelligence Specialist) as a baseline for selecting and assessing the personnel predictors. The analyst reviewed the tasks trained for the 96H and selected those that are similar to the tasks required for the operation of the NLOS-CA console. The analyst then converted these tasks to notional NLOS-CA operator tasks. These tasks are shown at Table I1-1-1.

**TABLE I1-1-1 96H AND 11H TASK**

| <b>96H Tasks*</b>   | <b>11H Tasks**</b>   |
|---|--|
| Performs preflight, preoperation, operator, and unit maintenance on assigned sensor SERE and associated equipment.  | Performs preoperation operation checks on NLOS-CA console and launcher.  |
| Troubleshoots sensor and associated systems to determine nature and location of fault occurrence.   | Performs BIT/BITE on NLOS-CA console, launcher, and associated systems to determine nature and location of fault occurrence. |
| Records operation and maintenance data in equipment log for support maintenance services.   | Records operation and maintenance data in equipment log for support maintenance services.                                    |
| Performs aerial missions using visual acquisition skills and the operation of manned aerial infrared, radar, photographic, or similar sensor systems, including associated data transmission links and ground data terminal stations. | Performs aerial missions using visual acquisition skills and the operation the NLOS-CA console.                              |
| Visually acquires targets, or interprets target signatures appearing on near real time sensor system displays and renders inflight spot reports on targets of opportunity.  | Visually acquires targets, or interprets target signatures appearing on near real time system displays.                      |
| Recognizes enemy electronic countermeasures directed against aircraft or ground component communications or sensor system equipment and performs applicable ECCM.   | Recognizes enemy countermeasures directed against missile or video equipment and performs applicable ECCM.                   |

\*Based upon March 1993 TAD.

\*\*Tasks developed by comparability analysis.

**I1-2 RESULTS.** A discussion of results of output from the Expert Choice (TM) model is provided in the following subparagraphs.

**I1-2.1 Hand Eye (HE) Coordination.** The two key evaluation criteria for this predictor are PULHES and the AFQT. Soldiers in MOS 11H exceed the 96H requirements for the HE Coordination predictor.

**I1-2.1.1 PULHES.** The two physical attributes from the PULHES that can be used as indicators for determining HE coordination are upper extremities and eyes. Table I1-2-1 is a comparison between these two physical attributes for MOS 11H and 96H.

**TABLE I1-2-1 11H AND 96H PULHES**

| MOS | Upper Extremities | Eyes     |
|-----|-------------------|----------|
| 11H | 1*                | 2 (RG)** |
| 96H | 2*                | 1 (NC)** |

\*1- No loss of digits, or limitation of motion  
\*2- Slightly limited mobility of joints which does not prevent moderate marching, climbing, running or digging.  
\*\*1- Vision correctable to 20/20 in each eye.  
\*\*2- Distant vision acuity correctable to 20/40-20/70; 20/30-20-100; 20/20-20/400.  
\*\*RG- Must be able to distinguish Red/Green colors  
\*\*NC- Normal color vision

The 11H requirement of a physical profile serial of 1 for upper extremities exceeds the 96H requirement of 2. The 96H requirement of a physical profile serial of 1 for eyes exceeds the 11H requirement of 2. However, a physical profile serial of 2 for vision means that vision must be correctable to within the normal vision range.

**I1-2.1.2 AFQT.** One of the component tests considered in the computation of the AFQT requires the testee to determine the shape of a "box" based upon an "exploded" diagram. This test demonstrates the soldiers ability to envision the end product resulting from folding the "box" along designated lines. While this test does not directly test hand eye coordination, it does demonstrate that the soldier has the ability to comprehend complex shapes and envision how they are assembled. This is why the AFQT has less importance in determining HE coordination than the PULHES. Table I1-2-2 is a comparison between the AFQT Test Score Categories for MOS 11H and 96H.

**TABLE I1-2-2 11H AND 96H AFQT**

| MOS | CATEGORIES (in %)* |      |      |      |
|-----|--------------------|------|------|------|
|     | I                  | II   | IIIA | IIIB |
| 11H | 4.3                | 34.2 | 24.4 | 27.1 |
| 96H | 10.2               | 54.5 | 24.4 | 8.5  |

\*Based upon March 1993 TAD

In 1993, 62.9% of the soldiers in MOS 11H were in the Test Score Categories I-III compared to 89.1% of the soldiers in MOS 96H. This comparison shows a difference between the two MOS of 26.6 percentage points; if the evaluation includes category IIIB then the difference is only 7.6 percentage points. (11H Cat I-III = 90%; 96H Cat I-III = 97.6%).

**I1-2.2 Reading Ability.** The key evaluation criterion for this predictor is the Reading Grade Level. Soldiers in MOS 11H are approximately 47% points below those in 96H. Table I1-2-3 is a comparison between the Reading Grade Levels for MOS 11H and 96H.

**TABLE I1-2-3 11H AND 96H READING GRADE LEVEL DISTRIBUTION**

| MOS | READING GRADE LEVELS (in %)* |      |      |       |      |
|-----|------------------------------|------|------|-------|------|
|     | <7                           | 7-9  | 9-11 | 11-12 | >12  |
| 11H | 1.6                          | 27.6 | 19.6 | 46.2  | 5.0  |
| 96H | 0.3                          | 12.2 | 16.2 | 59.4  | 11.9 |

\*Based upon March 1993 TAD

In 1993, 51.2% of the soldiers in MOS 11H had a Reading Grade Level above the 11th grade compared to 71.3% of the soldiers in MOS 96H. While this comparison shows a difference between the two MOS of 20.1 percentage points, if the evaluation is expanded to include the 9-11th grade reading level then the difference is still 16.7 percentage points. (11H Reading Grade Level 9->12 = 70.8%; 96H Reading Grade Level = 87.5%).

**I1-2.3 Mathematical Ability.** The key evaluation criteria for this predictor are the ASVAB and Education Level. Soldiers in MOS 11H scored approximately 50% point lower than the 96H. Table I1-2-4 is a comparison between the Education Levels for MOS 11H and 96H.

**TABLE I1-2-4 11H AND 96H EDUCATION LEVEL DISTRIBUTION**

| MOS | EDUCATION LEVELS (in %)* |         |
|-----|--------------------------|---------|
|     | HSG                      | Non-HSG |
| 11H | 99.4                     | 0.6     |
| 96H | 100                      | 0.0     |

\*Based upon March 1993 TAD

In 1993, 99.4% of the soldiers in MOS 11H were high school graduates compared to 100% of the soldiers in MOS 96H. This comparison shows a difference between the two MOSs of only 0.6 of a percentage point.

**I1-2.4 Vision.** The key evaluation criteria for this predictor are color vision and visual acuity. Soldiers in MOS 11H scored approximately 55% point lower than 96H. Table I1-2-2 shows a comparison of the eyes between MOS 11H and 96H. The primary distinguishing attribute is the requirement for soldiers in MOS 96H to have

normal color vision, while MOS 11H requires that the soldier must be able to distinguish between red and green colors. Since it was assumed that the NLOS-CA console displays would be in color this would seriously impact the trainability of a person without normal color vision.

**I1-2.5 Analytical Skills.** The three evaluation criteria for this predictor are AFQT, ASVAB, and education level. Soldiers in MOS 11H scored approximately 55% points lower than 96H.

**I1-2.5.1 AFQT.** As stated in paragraph X.2.1.2, 90% of the 11H soldiers are in AFQT Test Score Categories IIIB-I.

**1-I2.5.2 ASVAB.** The comparison of the ASVAB is based upon on the component test rather than the Cutoff Score. The ASVAB Test Components for MOS 11H and 96H are shown at Table I1-2-5.

**TABLE I1-2.5-5 11H AND 96H ASVAB TEST AND TEST COMPONENTS**

| MOS | TEST* | TEST COMPONENTS** |    |    |    |    |    |    |  |
|-----|-------|-------------------|----|----|----|----|----|----|--|
|     |       | AR                | AS | CS | GS | MC | MK | VE |  |
| 11H | CO    | X                 | X  | X  |    | X  |    |    |  |
| 96H | SC    | X                 | X  |    | X  |    |    | X  |  |
|     | ST    |                   |    |    | X  | X  | X  | X  |  |

\*CO - Combat

SC - Surveillance and Communications

ST - Skilled Technical (Secondary ASVAB Test for 96H)

\*\*AR - Arithmetic Reasoning

AS - Auto & Shop Information

CS - Coding Speed

GS - General Science

MC - Mechanical Comprehension

MK - Math Knowledge

VE - Verbal Equivalent - Consist of:

WK - Work Knowledge

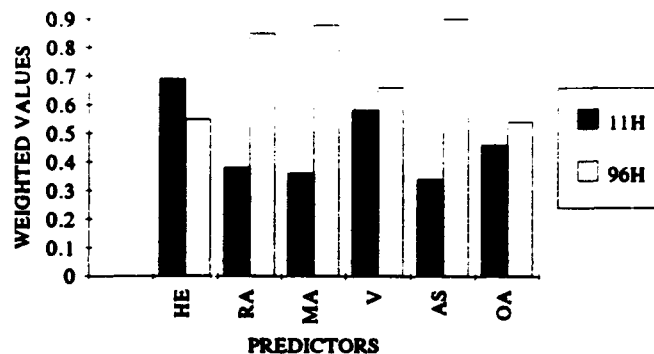
PC - Paragraph Comprehension

MOS 96H has a primary ASVAB test of SC and a secondary of ST. MOS 11H ASVAB test is CO. The difference between the SC and CO ASVAB tests is that the SC test requires a component of VE while the CO requires a component of CS. The only common test component between the ST and CO ASVAB tests is the component MK. The ST ASVAB test requires that the soldier demonstrates mathematical and verbal skills. The ST test also requires the soldier to demonstrate knowledge in the general science area. There is no equivalent of the GS test for the 11H MOS. However, considering the fact that 99.4% of the 11H soldiers are high school graduates they should possess a general knowledge scientific principles.

**I1-2.5.3 Education Level.** As stated in paragraph I1-2.3 100% of the soldiers in MOS 96H are high school graduates while 99.4% of the 11H soldiers are high school graduates.

**I1-3.0 SENSITIVITY ANALYSIS.** A series of sensitivity analyses were conducted to determine the most reasonable ways to reduce the risk associated with the requiring the 11H to operate the NLOS-CA console. The following is a discussion of these analyses.

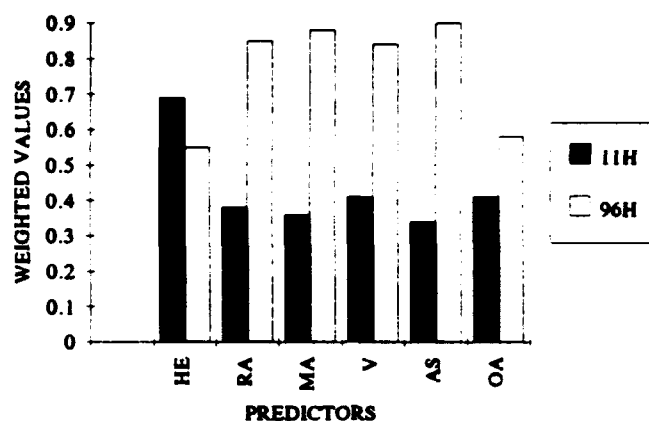
**I1-3.1 Color Vision.** Making normal color vision a requirement for soldiers in MOS 11H will reduce the overall difference between the 96H and 11H MOS to .08 points. The same result can be achieved by designing the displays for soldiers that do not possess normal color vision. Figure I1-3-1 is a graphical representation of the results of this analysis.



**FIGURE I1-3-1 RESULTS OF REQUIRING MOS 11H TO POSSESS NORMAL COLOR VISION**

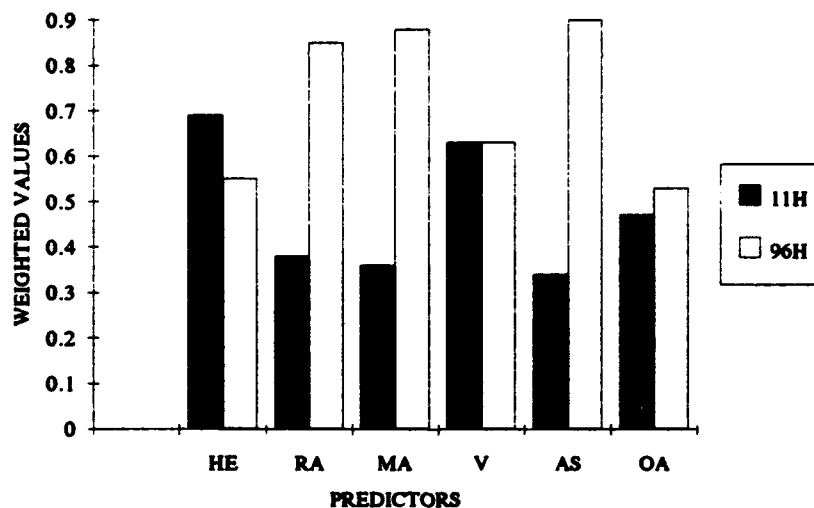
HE - HAND EYE COORDINATION  
RA - READING ABILITY  
MA - MATH ABILITY  
V - VISION  
AS - ANALYTICAL SKILLS  
OA - OVERALL SCORE

**I1-3.2 Visual Acuity.** Making the PULHES physical serial profile requirement a 1 for eyes soldiers in MOS 11H will reduce the overall difference between the 96H and 11H MOS to .17 points. Figure I1-3-2 is a graphical representation of the results of this analysis.



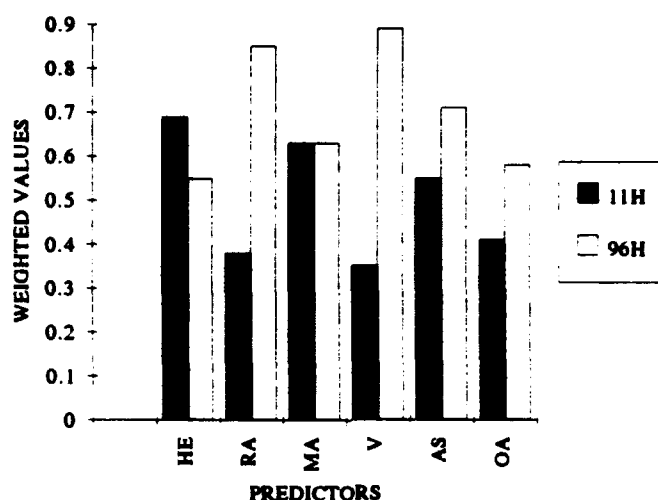
**FIGURE I1-3-2 RESULTS OF REQUIRING MOS 11H TO POSSESS THE SAME VISUAL ACUITY REQUIREMENTS AS MOS 96H**

**I1-3.3 Color Vision and Visual Acuity.** If these two attributes are combined the overall difference between the 11H and 96H MOS is reduced to .06 points. Figure I1-3-3 is a graphical representation of the results of this analysis.



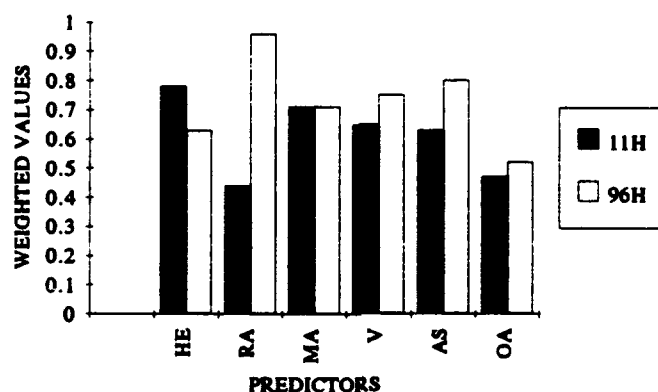
**FIGURE I1-3-3 RESULTS OF REQUIRING MOS 11H TO POSSESS NORMAL COLOR VISION AND THE SAME VISUAL ACUITY REQUIREMENTS AS MOS 96H**

**I1-3.4 ASVAB Test.** If the soldiers in the 11H MOS were required to have a secondary ASVAB test of ST this would reduce the overall difference between the 96H and 11H MOS to .17 points. Figure I1-3-4 is a graphical representation of the results of this analysis.



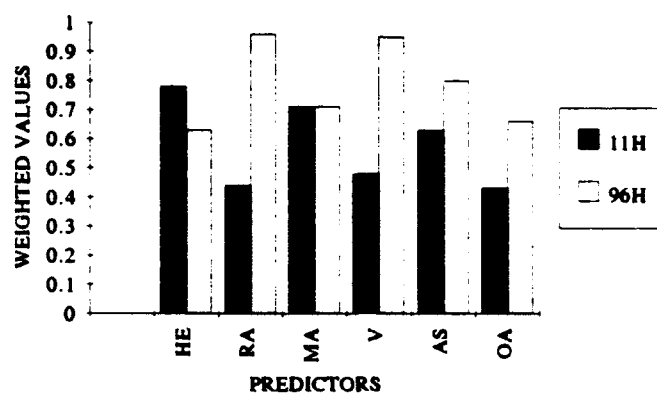
**FIGURE I1-3-4 RESULTS OF REQUIRING MOS 11H TO POSSESS A SECONDARY ASVAB TEST OF ST**

**I1-3.5 ASVAB Test and Color Vision.** If the soldiers in MOS 11H were required to have a secondary ASVAB of ST and normal color vision the difference between the 96H and 11H MOS is reduced to .05 points. Figure I1-3-5 is a graphical representation of the results of this analysis.



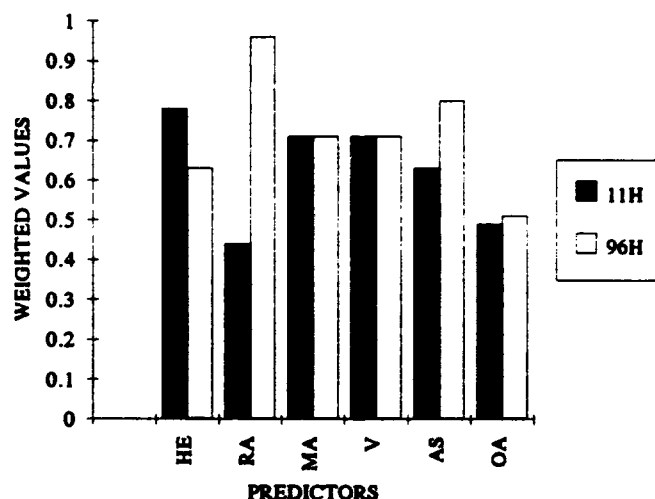
**FIGURE I1-3-5 RESULTS OF REQUIRING MOS 11H TO POSSESS A SECONDARY ASVAB TEST OF ST AND NORMAL COLOR VISION**

**I1-3.6 ASVAB Test and Visual Acuity.** If the soldiers in MOS 11H were required to have a secondary ASVAB of ST and a PULHES physical serial profile requirement of 1 for eyes the difference between the 96H and 11H MOS is reduced to .23 points. Figure I1-3-6 is a graphical representation of the results of this analysis.



**FIGURE I1-3-6 RESULTS OF REQUIRING MOS 11H TO POSSESS A SECONDARY ASVAB TEST OF ST AND THE SAME VISUAL ACUITY REQUIREMENTS AS MOS 96H**

**I1-3.7 ASVAB Test, Normal Color, and Visual Acuity.** If the three evaluation criteria were combined the overall difference between the 96H and 11H MOS is to .02 points. Figure I1-3-7 is a graphical representation of the results of this analysis.



**FIGURE I1-3-7 RESULTS OF REQUIRING MOS 11H TO POSSESS A SECONDARY ASVAB TEST OF ST, NORMAL COLOR VISION, AND THE SAME VISUAL ACUITY REQUIREMENTS AS MOS 96H**

**SECTION II**  
**TARGET AUDIENCE DESCRIPTION**

## Target Audience Description (TAD)

MOS 11H : Heavy Antiarmor Weapons Infantryman

CMF 11 : Infantry

Branch 1 : Infantry

Primary ASVAB : CO Actual Cutoff : 90

(1) Test: Combat (CO)

(2) Components of the CO Test Include

Arithmetic Reasoning (AR)

Auto & Shop Information (AS)

Mechanical Comprehension (MC)

Coding Speed (CS)

### Section A: STATISTICS

#### 1. Manpower Status (FY 1993)

| Skill Level | 1      | 2     | 3     | 4     | 5     |        |
|-------------|--------|-------|-------|-------|-------|--------|
| Grade(s)    | E1-E4  | E5    | E6    | E7    | E8-E9 | Total  |
| Authorized  | 2526.0 | 503.0 | 632.0 | 387.0 | 120.0 | 4168.0 |
| Operating   | 2638.0 | 577.0 | 668.0 | 365.0 | 135.0 | 4383.0 |
| Oper/Auth   | 1.04   | 1.15  | 1.06  | 0.94  | 1.13  | 1.05   |

#### 2. Manpower Requirement Projections

| Skill Level  | 1     | 2   | 3   | 4   | 5     |       |
|--------------|-------|-----|-----|-----|-------|-------|
| Grade(s)     | E1-E4 | E5  | E6  | E7  | E8-E9 | Total |
| Current 1993 | 2638  | 577 | 668 | 365 | 135   | 4383  |

#### 3. Aptitude (in percentages)

##### a. AFQT - Test Score Category Distribution

|              | Categories |      |      |      |      |
|--------------|------------|------|------|------|------|
|              | I          | II   | IIIA | IIIB | IV   |
| Current 1993 | 4.3        | 34.2 | 24.4 | 27.1 | 10.0 |

##### b. ASVAB Aptitude Area Score Distribution

|              | <75 | 75-84 | 85-94 | 95-104 | 105-114 | 115-124 | 125-134 |
|--------------|-----|-------|-------|--------|---------|---------|---------|
| Current 1993 | 0.5 | 5.5   | 15.0  | 23.6   | 31.5    | 19.0    | 4.8     |

##### c. Reading Grade Level Distribution

|              | <7  | 7-9  | 9-11 | 11-12 | >12 |
|--------------|-----|------|------|-------|-----|
| Current 1993 | 1.6 | 27.6 | 19.6 | 46.2  | 5.0 |

##### d. Civilian Education

|              | HSG  | Non-HSG |
|--------------|------|---------|
| Current 1993 | 99.4 | 0.6     |

**4. Biographical Information (in percentages)**

**a. Gender Mix**

|              | Male  | Female |
|--------------|-------|--------|
| Current 1993 | 100.0 | 0.0    |

**SECTION B: DESCRIPTIVE INFORMATION (SOURCE AR 611-201, Jun 91)**

**1. Rescind date: -0-**

**2. Education: NA**

**3. Security Clearance: U**

**4. Physical Qualifications:**

**a. PULHES Profile: 111221**

**b. MEPSCAT Rating: VH**

**c. Vision Requirements: RG**

## **5. Skills and Knowledge Trained:**

| <b>Skill Level</b> | <b>Tasks</b>  |
|--------------------|---|
| 10                 | Defends position and self against enemy attack.   |
| 10                 | Employs individual weapons.   |
| 10                 | Employs cover, concealment, and camouflage.   |
| 10                 | Prepares, loads and fires the TOW weapons system.   |
| 10                 | Drives the TOW carrier.   |
| 10                 | Protects self, weapons, and equipment from chemical and other contamination.                        |
| 10                 | Assists in construction of fortifications and barriers including minefields and obstacles.          |
| 10                 | Assists in breaching and clearing minefields and obstacles.   |
| 10                 | Identifies enemy armor and other targets.   |
| 10                 | Performs preventive maintenance and assists in organizational maintenance on weapons and equipment. |
| 10                 | Performs land navigation functions.   |
| 10                 | Carries, prepares, and stores ammunition.   |
| 10                 | Administers first aid.  |
| 10                 | Applies field sanitation methods.   |
| 10                 | Reacts to oral commands and visual signals.   |
| 10                 | Applies principles of escape and evasion.   |
| 10                 | Renders oral reports on enemy activities.   |
| 10                 | Lays field wire.  |
| 10                 | Performs basic communications functions, and operates communications equipment.                     |
| 10                 | Applies security and safety measures.   |
| 10                 | Collects and reports tactical information as member of combat or reconnaissance patrol.             |
| 10                 | Prepares simple demolitions.  |
| 10                 | Operates wheeled and tracked vehicles to transport personnel,                                       |

**supplies, and equipment.**

- 10 Performs drill and ceremonies and other post, camp, and station duties.
- 10 Carries and prepares ammunition for use and loads weapons.
- 10 Administers first aid.
- 10 Conducts preventive maintenance checks and services (PMCS) on organizational equipment.
- 20 Receives and implements combat orders.
- 20 Directs employment of personnel in offensive, defensive, and retrograde combat operations.
- 20 Evaluates terrain.
- 20 Selects weapons emplacement sites, and assigns target areas and fields of fire.
- 20 Directs and adjusts fires to destroy enemy targets.
- 20 Supervises construction of fortifications, camouflage, and security.
- 20 Reads and interprets maps and aerial photos.
- 20 Prepares range cards and field sketches.
- 20 Supervises crew training, drill, march order, and firing.
- 20 Trains crew in day and night firing techniques.
- 20 Supervises various work details.
- 30 Receives and issues orders.
- 30 Supervises tactical deployment of section.
- 30 Supervises receipt, storage, and distribution of ammunition, supplies, and food.
- 30 Establishes observation post.
- 30 Orders fire to destroy enemy equipment, positions, and personnel.
- 30 Coordinates fire power.
- 30 Observes and shifts section fires.
- 30 Advises on tactical situation.

- 30 Requests and adjusts supporting fires.
- 30 Coordinates weapons and vehicle employment.
- 30 Supervises maintenance of section weapons and equipment.
- 30 Instructs replacement personnel.
- 30 Enforces communications procedures.
- 30 Employs weapons to maximize the capabilities of weapons.
- 30 Employs weapons to take advantage of the terrain.
- 40 Assists in planning, organizing, directing, supervising, training, coordinating, and reporting activities of subordinate sections and squads.
- 40 Advises commander on tactical employment of weapons system.
- 40 Assists in coordination and administration matters, and communications activities.
- 40 Performs duties as vehicle element or dismount element leader.
- 40 Assists platoon leader in controlling infantry fighting platoon in mounted or dismounted operations.
- 40 Acts as platoon leader in superior's absence.
- 40 Processes operations and intelligence information.
- 40 Assists in planning, organizing, directing, supervising, training, coordinating, and reporting activities of subordinate squads.
- 40 Supervises receipt, storage, and distribution of ammunition, supplies, equipment, and food to subordinate elements.
- 40 Supervises platoon preventive and operator maintenance activities of IFV.
- 40 Collects intelligence information to support combat operations.
- 40 Supervises and trains personnel in fighting vehicle operations, maintenance, and intelligence activities.
- 40 Assists in dissemination of intelligence information to unit and staff sections.
- 40 Assists in coordination and implementation of combat

operations, training programs, and administrative and communications procedures.

- 40 Assists in production and administration of staff journals, files, records, and reports.
- 40 Assists in organization and operation of the tactical operations center.
- 50 Provides tactical and technical guidance to subordinates, and professional support to lower and higher grade personnel in the accomplishment of their duties.
- 50 Serves as principal noncommissioned officer in a heavy antiarmor weapons company and supervises the processing of operations and intelligence information in an infantry battalion or higher level unit.
- 50 Performs principal noncommissioned officer duties associated with first sergeant SQI "M".
- 50 Plans, coordinates, supervises, and participates in activities pertaining to organization, training, and combat operations and intelligence of units at battalion or higher level.

**Note :** All values reflect use of the primary ASVAB and Cutoff where relevant.

## Target Audience Description (TAD)

MOS 96H : Aerial Intelligence Specialist  
 CMP 96 : Military Intelligence  
 Branch 35 :

Primary ASVAB : SC Actual Cutoff : 95  
 (1) Test: Surveillance & Communication (SC)

(2) Components of the SC Test Include

Arithmetic Reasoning (AR)  
 Auto & Shop Information (AS)  
 Mechanical Comprehension (MC)  
 Verbal Equivalent (VE) = WK + PC)  
 Work Knowledge (WK)  
 Paragraph Comprehension (PC)

Secondary ASVAB : ST Actual Cutoff : 95  
 (1) Test: Skilled Technical (ST)

(2) Components of the ST Test Include

Verbal Equivalent (VE) = WK + PC)  
 Work Knowledge (WK)  
 Paragraph Comprehension (PC)  
 Math Knowledge (MK)  
 Mechanical Comprehension (MC)  
 General Science (GS)

### Section A: STATISTICS

#### 1. Manpower Status (FY 1993)

| Skill Level | 1     | 2    | 3    | 4    | 5     |       |
|-------------|-------|------|------|------|-------|-------|
| Grade(s)    | E1-E4 | E5   | E6   | E7   | E8-E9 | Total |
| Authorized  | 82.0  | 37.0 | 29.0 | 19.0 | 0.0   | 167.0 |
| Operating   | 87.0  | 31.0 | 30.0 | 28.0 | 0.0   | 176.0 |
| Oper/Auth   | 1.06  | 0.84 | 1.03 | 1.47 | 0.00  | 1.05  |

#### 2. Manpower Requirement Projections

| Skill Level  | 1     | 2  | 3  | 4  | 5     |       |
|--------------|-------|----|----|----|-------|-------|
| Grade(s)     | E1-E4 | E5 | E6 | E7 | E8-E9 | Total |
| Current 1993 | 87    | 31 | 30 | 28 | 0     | 176   |

#### 3. Aptitude (in percentages)

##### a. AFQT - Test Score Category Distribution

|              |  | Categories |      |      |      |     |
|--------------|--|------------|------|------|------|-----|
|              |  | I          | II   | IIIA | IIIB | IV  |
| Current 1993 |  | 10.2       | 54.5 | 24.4 | 8.5  | 2.3 |

**b. ASVAB Aptitude Area Score Distribution**

|         |      | <75 | 75-84 | 85-94 | 95-104 | 105-114 | 115-124 | 125-134 |
|---------|------|-----|-------|-------|--------|---------|---------|---------|
| Current | 1993 | 0.6 | 3.3   | 10.1  | 24.8   | 31.3    | 23.6    | 6.4     |

**c. Reading Grade Level Distribution**

|         |      | <7  | 7-9  | 9-11 | 11-12 | >12  |
|---------|------|-----|------|------|-------|------|
| Current | 1993 | 0.3 | 12.2 | 16.2 | 59.4  | 11.9 |

**d. Civilian Education**

|         |      | HSG   | Non-HSG |
|---------|------|-------|---------|
| Current | 1993 | 100.0 | 0.0     |

**4. Biographical Information (in percentages)**

**a. Gender Mix**

|         |      | Male | Female |
|---------|------|------|--------|
| Current | 1993 | 84.1 | 15.9   |

**SECTION B: DESCRIPTIVE INFORMATION (SOURCE AR 611-201, Jun 91)**

**1. Rescind date: -0-**

**2. Education: NA**

**3. Security Clearance: S**

**4. Physical Qualifications:**

**a. PULHES Profile: 222111**

**b. MEPSCAT Rating: MH**

**c. Vision Requirements: NC**

### **5. Skills and Knowledge Trained:**

#### **Skill Level**

#### **Tasks**

- 1F Performs preflight, preoperation, operator, and unit maintenance on assigned sensor SERE and associated equipment.**
- 1F Troubleshoots sensor and associated systems to determine nature and location of fault occurrence.**
- 1F Records operation and maintenance data in equipment log for support maintenance services.**
- 1F Participates in mission planning for aerial surveillance, aerial visual reconnaissance, aerial search and rescue, aerial radiological survey, and similar intelligence and information gathering missions.**
- 1F Operates data link terminal station and performs SLAR imagery analysis.**
- 1F Prepares and operates aerial surveillance/electronic intercept systems and associated equipment.**
- 1F Performs aerial missions using visual acquisition skills and the operation of manned aerial infrared, radar, photographic, or similar sensor systems, including associated data transmission links and ground data terminal stations.**
- 1F Performs radio communications and aids aviator in aerial navigation.**
- 1F Recognizes enemy electronic countermeasures directed against aircraft or ground component communications or sensor system equipment and performs applicable ECCM.**
- 1F Visually acquires targets, or interprets target signatures appearing on near real time sensor system displays and renders inflight spot reports on targets of opportunity.**
- 1F Participates in mission debriefing and assists imagery analyst in analysis of imagery recordings.**
- 2F Assists imagery analyst to interpret imagery recording using imagery analysis keys and reference material to obtain essential information.**
- 2F Operates and supervises the operation of aerial surveillance and associated equipment.**
- 2F Operates and supervises operation of aerial surveillance/electronic intercept systems and associated equipment.**

- 2F Assists aviator in flight planning, weather analysis, navigational computations, and aircraft preflight inspection procedures.
- 2F Prepares aerial surveillance and associated equipment for operation.
- 2F Performs duties shown in preceding level of skill and provides technical guidance to lower grade personnel in accomplishment of their duties.
- 2F Serves as assistant instructor at service school.
- 3F Performs duties shown in preceding level of skill and provides technical guidance to lower grades in performance of their duties.
- 3F Supervises operations and activities of aerial surveillance, electronic intercept, and data terminal section.
- 3F Supervises inspection and operator maintenance of section-assigned SERE equipment and operator and organizational maintenance of assigned sensor and associated equipment.
- 3F Directs and conducts job proficiency and SERE training of subordinates in section to which assigned.
- 3F Assists in planning, employment, and management of aerial surveillance, electronic intercept, and data terminal systems.
- 3F Serves as instructor at service school.
- 3F Assists imagery analyst in analysis and interpretation of aerial sensor imagery to determine geographical features of terrain and physical features of enemy installations, deployment, weapons, equipment, and defenses.
- 3F Conducts or participates in briefing of commander and staff of supported headquarters on capabilities and limitations of aerial surveillance and similar missions, and on results obtained from their employment.
- 4F Performs duties shown in preceding level of skill and provides technical guidance to lower grade personnel in accomplishment of their duties.
- 4F Supervises operations and activities of platoon or detachment to which assigned.
- 4F Plans and organizes work schedules.
- 4F Assigns duties and instructs section sergeant in proper work

techniques and procedures.

- 4F    Reviews and critiques mission results obtained by unit subordinates.
- 4F    Directs and conducts aviation-peculiar standardization training for subordinate personnel.
- 4F    Advises commander on interface of aerial surveillance, electronic intercept, and data terminal systems and associated equipment.
- 4F    Advises commander on interface of aerial surveillance with ground surveillance.
- 4F    Coordinates personnel and aerial sensor section on data terminal section or team employment, deployment, and operational supply and maintenance support requirements.
- 4F    Serves as instructor at service school.

**Note :** All values reflect use of the primary ASVAB and Cutoff where relevant.

**NON-LINE OF SIGHT - COMBINED ARMS (NLOS-CA)  
MANPOWER, PERSONNEL AND LOGISTICS IMPACT ANALYSES (LIA)**

**APPENDIX J  
MTMC/TEA TRANSPORTATION SUB-ANALYSIS**



REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
MILITARY TRAFFIC MANAGEMENT COMMAND  
TRANSPORTATION ENGINEERING AGENCY  
720 THIMBLE SHOALS BOULEVARD, SUITE 130  
NEWPORT NEWS, VIRGINIA 23606-2574

MTTE-COEA (70-47a)

21 OCT 1993

MEMORANDUM FOR Director, U.S. Army TRAC-LEE, ATTN: ATRC-LS (Mr. F. Vanover), Fort Lee, VA 23801-6140

SUBJECT: Transportability and Deployability Analysis for the Non-Line of Sight-Combined Arms Logistics Impact Analysis (NLOS-CA LIA)

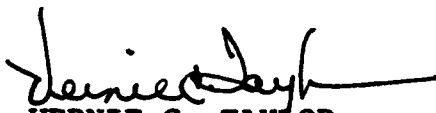
1. Reference memorandum, TRAC-LEE, ATRC-LS, 6 July 93, Subject: Logistics Data Support for the NLOS-CA LIA.

2. In the referenced memorandum, you requested that we complete our section of the NLOS-CA LIA. We are enclosing the NLOS-CA Transportability and Deployability Analysis.

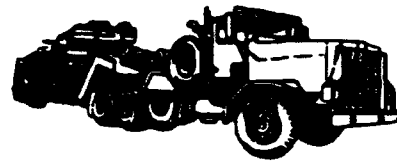
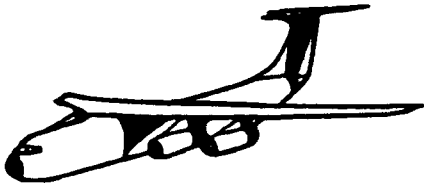
2. If you have any questions or need further assistance, please contact Mr. R. Bryan Reyns, DSN 927-4646 or (804) 599-1107, or LCDR C. Ben Lawrimore, DSN 927-5266 or (804) 599-1667.

FOR THE DIRECTOR:

Encl

  
VERNIE C. TAYLOR  
Project Advisory Board  
NLOS-CA LIA Team

R-22 OCT 93  
m.h.



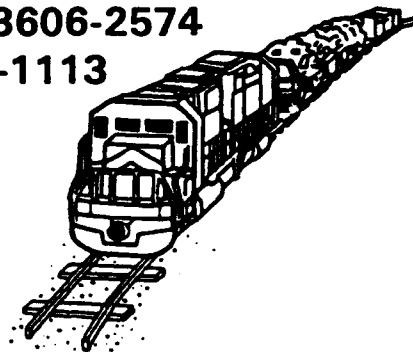
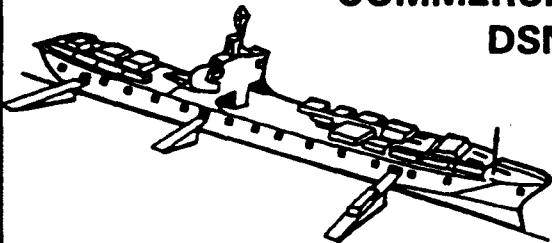
OCTOBER 1993

**TRANSPORTABILITY & DEPLOYABILITY  
ANALYSIS  
for the  
NON-LINE OF SIGHT-COMBINED ARMS  
(NLOS-CA)**

Prepared by:  
R. BRYAN REYNS  
LCDR C. BEN LAWRIKORE



**MILITARY TRAFFIC MANAGEMENT COMMAND  
TRANSPORTATION ENGINEERING AGENCY  
720 THIMBLE SHOALS BLVD., SUITE 130  
NEWPORT NEWS, VIRGINIA 23606-2574  
COMMERCIAL (804) 599-1113  
DSN 927-4646**



**NON-LINE OF SIGHT-COMBINED ARMS (NLOS-CA)  
Transportability and Deployability Analysis**

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NON-LINE OF SIGHT-COMBINED ARMS (NLOS-CA)  
Transportability and Deployability Analysis

1. (U) General.

a. (U) Transportability and Deployability. This analysis addresses the transportability and deployability impact of adding a NLOS-CA capability to both a heavy and light brigade.

(1) (U) Transportability is defined as the inherent capability of an item of equipment or a system to be efficiently moved by required transportation assets and modes of transport.

(2) (U) Deployability is the capability of a force to be moved intraCONUS, intertheater (strategic), and intratheater (tactical) to support a military operation.

b. (U) Purpose and Objectives. This analysis evaluates the impact of fielding each alternative system on item transportability and force deployability by the highway, air, rail, and marine modes.

c. (U) Scope. We completed transportability and deployability analyses for each alternative. The analyses discuss transportability and deployability requirements and restrictions imposed on system and unit equipment. The transportability analyses address system-peculiar items only, while the deployability analyses consider all unit equipment at the battalion level as given in the tables of organization and equipment (TOE) in appendix A. Some movement restrictions may be eased during emergency deployments. This, however, cannot be guaranteed. Therefore, all transportability and deployability restrictions imposed during peacetime must be met.

d. (U) System Characteristics. The dimensions and weights for each alternative system are shown in Table 1.1. The base case and each alternative force consists of a heavy and light brigade.

(1) (U) Base Case. The base case has no NLOS capability.

(2) (U) Alternative 1. Alternative 1 includes the addition of an NLOS-CA company, to both the heavy and light brigades, equipped with Fiber Optic Guided Missile (FOG-M) systems carried on Heavy High Mobility Multipurpose Wheeled Vehicles (HHVs).

(3) (U) Alternative 2. Alternative 2 includes the addition of a Long Range Smart Mortar (LRSM) company, to both the heavy and light brigades. The heavy variant (LRSM HVY) is mounted on the M1064 mortar carrier, and the light variant (LRSM LT) is mounted on the HHV.

e. (U) Force Structure. The force structures for the base case and the alternatives were taken from the April 1993 Objective TOE. The Objective TOE has all Basis of Issue Plans applied. These force structures have been approved for use in this study by the Training and Doctrine Command (TRADOC) Analysis Command (TRAC) Study Director.

**TABLE 1.1**  
**SYSTEM-PECULIAR EQUIPMENT DIMENSIONAL AND WEIGHT DATA**

| Item   | Length<br>(Inches) | Width<br>(Inches) | Height<br>(Inches) | Weight<br>(Pounds) |
|--|--------------------|-------------------|--------------------|--------------------|
| FOG-M  | 187.5              | 85.0              | 72.1               | 8,945              |
| LRSM LT  | 335.4              | 85.0              | 83.0               | 11,985             |
| LRSM HVY   | 209.4              | 119.0             | 104.8              | 27,635             |
| <b>Legend:</b><br>FOG-M: Fiber Optic Guided Missile<br>LRSM LT: Long Range Smart Mortar, Light Version<br>LRSM HVY: Long Range Smart Mortar, Heavy Version |                    |                   |                    |                    |

(1) (U) Base Case Force Structure. The base case heavy brigade consists of one headquarters, headquarters company (HHC), two mechanized infantry battalions, and two heavy tank battalions, as shown in Table 1.2. The base case light brigade consists of one HHC and three light infantry battalions as shown in Table 1.3.

(2) (U) FOG-M Force Structure. The alternative one heavy brigade consists of one HHC, two mechanized infantry battalions, two heavy tank battalions, and one light NLOS company, as shown in Table 1.4. The alternative one light brigade consists of one HHC, three light infantry battalions and one light NLOS company, as shown in Table 1.5.

(3) (U) LRSM Force Structure. The alternative two heavy brigade consists of one HHC, two mechanized infantry battalions, two heavy tank battalions, and one heavy NLOS company, as shown in Table 1.6. The alternative two light brigade consists of one HHC and three light infantry battalions, and one light NLOS company, as shown in Table 1.7.

2. (U) Summary of Findings. These results are based on the requirement for maximum transportability with minimum deployment assets during intraCONUS, intertheater, and intratheater transport. The following summarizes the major advantages and disadvantages of the systems.

a. (U) IntraCONUS.

(1) (U) Highway. The FOG-M and the LRSM LT will move over CONUS highways without restriction. The LRSM HVY is transportable on the M916/M172A1 truck tractor/semitrailer and similar combinations. However, this combination may require special routing in the U.S. because of width restrictions.

(2) (U) Rail. The FOG-M, LRSM LT, and LRSM HVY are capable of unrestricted rail transport within CONUS.

(3) (U) Deployment.

(a) Heavy Brigade. The base case requires fewer railcars than the FOG-M or LRSM equipped forces. However, the FOG-M force, which requires only ten more railcars than the base case, does not require any additional deployment time. Table 2.1 summarizes the requirements for deployment by rail.

(b) Light Brigade. The base case requires ten fewer railcars than the FOG-M and eleven fewer than the LRSM equipped forces. However, deployment time does not differ significantly due to the small size of the force. Table 2.2 summarizes the requirements for deployment by rail.

b. (U) Intertheater.

(1) (U) Strategic Air. The FOG-M, LRSM LT, and LRSM HVY (reduced) are transportable by C-141 and C-5 aircraft.

(2) (U) Marine. All systems are readily transportable by strategic materiel transport vessels.

(3) (U) Deployment.

**TABLE 1.2**  
**CURRENT FORCE (BASE CASE-HEAVY) TOE SUMMARY**

| TOE  | Unit    | Multiple | Number of Vehicles | Square Feet | Short Tons | Measurement Tons |
|--|---------|----------|--------------------|-------------|------------|------------------|
| 87042L200  | HHC     | 1        | 32                 | 4,117       | 186        | 644              |
| 07245L000  | INF BN  | 2        | 321                | 58,178      | 4,873      | 11,704           |
| 17375L000  | TANK BN | 2        | 250                | 54,463      | 5,944      | 11,281           |
| Brigade Total  |         |          | 1,174              | 229,400     | 21,819     | 46,614           |
| <b>Legend:</b><br><b>HHC: Headquarters, Headquarters Company</b><br><b>INF BN: Infantry Battalion</b><br><b>TANK BN: Tank Battalion</b><br><b>TOE: Table of Organization and Equipment</b> |         |          |                    |             |            |                  |

**TABLE 1.3**  
**CURRENT FORCE (BASE CASE-LIGHT) TOE SUMMARY**

| <b>TOE</b>   | <b>Unit</b> | <b>Multiple</b> | <b>Number of<br/>Vehicles</b> | <b>Square<br/>Feet</b> | <b>Short<br/>Tons</b> | <b>Measurement<br/>Tons</b> |
|--|-------------|-----------------|-------------------------------|------------------------|-----------------------|-----------------------------|
| 77042L000  | HHC         | 1               | 74                            | 9,753                  | 359                   | 1,626                       |
| 07015L000  | INF BN      | 3               | 40                            | 5,541                  | 203                   | 793                         |
| <b>Brigade Total</b>   |             |                 | <b>194</b>                    | <b>26,375</b>          | <b>968</b>            | <b>4,005</b>                |
| <b>Legend:</b><br><b>HHC: Headquarters, Headquarters Company</b><br><b>INF BN: Infantry Battalion</b><br><b>TOE: Table of Organization and Equipment</b> |             |                 |                               |                        |                       |                             |

**TABLE 1.4**  
**FOG-M (ALTERNATIVE 1-HEAVY) TOE SUMMARY**

| <b>TOE</b>  | <b>Unit</b> | <b>Multiple</b> | <b>Number of<br/>Vehicles</b> | <b>Square<br/>Feet</b> | <b>Short<br/>Tons</b> | <b>Measurement<br/>Tons</b> |
|---|-------------|-----------------|-------------------------------|------------------------|-----------------------|-----------------------------|
| 87042L200   | HHC         | 1               | 32                            | 4,117                  | 186                   | 644                         |
| 07245L000   | INF BN      | 2               | 321                           | 58,178                 | 4,873                 | 11,704                      |
| 17375L000   | TANK BN     | 2               | 250                           | 54,463                 | 5,944                 | 11,281                      |
| 07348T200   | NLOS CO     | 1               | 36                            | 4,821                  | 203                   | 803                         |
| <b>Brigade Total</b>  |             |                 | <b>1,210</b>                  | <b>234,221</b>         | <b>22,022</b>         | <b>47,416</b>               |
| <b>Legend:</b><br><b>HHC: Headquarters, Headquarters Company</b><br><b>INF BN: Infantry Battalion</b><br><b>NLOS CO: Non-Line of Sight Company</b><br><b>TOE: Table of Organization and Equipment</b><br><b>TANK BN: Tank Battalion</b><br><b>FOG-M: Fiber Optic Guided Missile</b> |             |                 |                               |                        |                       |                             |

**TABLE 1.5**  
**FOG-M (ALTERNATIVE 1-LIGHT) TOE SUMMARY**

| <b>TOE</b>  | <b>Unit</b> | <b>Multiple</b> | <b>Number of<br/>Vehicles</b> | <b>Square<br/>Feet</b> | <b>Short<br/>Tons</b> | <b>Measurement<br/>Tons</b> |
|---|-------------|-----------------|-------------------------------|------------------------|-----------------------|-----------------------------|
| 77042L000   | HHC         | 1               | 74                            | 9,734                  | 344                   | 1,626                       |
| 07015L000   | INF BN      | 3               | 40                            | 5,541                  | 203                   | 793                         |
| 07348L200   | NLOS CO     | 1               | 36                            | 4,821                  | 203                   | 803                         |
| <b>Brigade Total</b>  |             |                 | <b>230</b>                    | <b>31,196</b>          | <b>1,171</b>          | <b>4,808</b>                |
| <b>Legend:</b><br><b>HHC: Headquarters, Headquarters Company</b><br><b>INF BN: Infantry Battalion</b><br><b>NLOS CO: Non-Line of Sight Company</b><br><b>TOE: Table of Organization and Equipment</b><br><b>FOG-M: Fiber Optic Guided Missile</b> |             |                 |                               |                        |                       |                             |

**TABLE 1.6**  
**LRSM (ALTERNATIVE 2-HEAVY) TOE SUMMARY**

| TOE   | Unit    | Multiple | Number of Vehicles | Square Feet | Short Tons | Measurement Tons |
|---|---------|----------|--------------------|-------------|------------|------------------|
| 87042L200   | HHC     | 1        | 32                 | 4,117       | 186        | 644              |
| 07245L000   | INF BN  | 2        | 321                | 58,178      | 4,873      | 11,704           |
| 17375L000   | TANK BN | 2        | 250                | 54,463      | 5,944      | 11,281           |
| 07348T100   | NLOS CO | 1        | 35                 | 5,744       | 460        | 1,032            |
| Brigade Total   |         |          | 1,209              | 235,144     | 22,279     | 47,646           |
| <b>Legend:</b><br>HHC: Headquarters, Headquarters Company<br>INF BN: Infantry Battalion<br>TANK BN: Tank Battalion<br>TOE: Table of Organization and Equipment<br>NLOS CO: Non-Line of Sight Company<br>LRSM: Long Range Smart Mortar |         |          |                    |             |            |                  |

**TABLE 1.7**  
**LRSB (ALTERNATIVE 2-LIGHT) TOE SUMMARY**

| TOE  | Unit    | Multiple | Number of Vehicles | Square Feet | Short Tons | Measurement Tons |
|--|---------|----------|--------------------|-------------|------------|------------------|
| 77042L000  | HHC     | 1        | 74                 | 9,753       | 359        | 1,626            |
| 07015L000  | INF BN  | 3        | 40                 | 5,541       | 203        | 793              |
| 07348T200  | NLOS CO | 1        | 48                 | 5,727       | 211        | 398              |
| Brigade Total  |         |          | 242                | 32,103      | 1,179      | 4,903            |
| <b>Legend:</b><br>HHC: Headquarters, Headquarters Company<br>INF BN: Infantry Battalion<br>TOE: Table of Organization and Equipment<br>NLOS CO: Non-Line of Sight Company<br>LRSB: Long Range Smart Mortar |         |          |                    |             |            |                  |

**TABLE 2.1**  
**SUMMARY OF RAILCAR REQUIREMENTS (HEAVY BDE)**

| System  | Unit    | Multiple        | Railcar Type    | Quantity |
|---|---------|-----------------|-----------------|----------|
| Base Case   | HHC     | 1               | 89-foot Flatcar | 8        |
|   |         |                 | 60-foot Flatcar | 1        |
|   | INF BN  | 2               | 89-foot Flatcar | 64       |
|   |         |                 | 60-foot Flatcar | 38       |
|   |         |                 | 68-foot DODX    | 4        |
| TANK BN   | 2       | 89-foot Flatcar | 51              |          |
|   |         | 60-foot Flatcar | 8               |          |
|   |         | 68-foot DODX    | 33              |          |
| Brigade Totals  |         |                 | 89-foot Flatcar | 238      |
|   |         |                 | 60-foot Flatcar | 93       |
|   |         |                 | 68-foot DODX    | 74       |
| Alternative 1   | HHC     | 1               | 89-foot Flatcar | 8        |
|   |         |                 | 60-foot Flatcar | 1        |
|   | INF BN  | 2               | 89-foot Flatcar | 64       |
|   |         |                 | 60-foot Flatcar | 38       |
|   |         |                 | 68-foot DODX    | 4        |
|   | TANK BN | 3               | 89-foot Flatcar | 51       |
| 60-foot Flatcar   |         |                 | 8               |          |
| 68-foot DODX  |         |                 | 33              |          |
| NLOS CO   | 1       | 89-foot Flatcar | 10              |          |
|   |         | 60-foot Flatcar | -               |          |
|   |         | 68-foot DODX    | -               |          |
| Brigade Totals  |         |                 | 89-foot Flatcar | 248      |
|   |         |                 | 60-foot Flatcar | 93       |
|   |         |                 | 68-foot DODX    | 74       |
| Alternative 2   | HHC     | 1               | 89-foot Flatcar | 8        |
|   |         |                 | 60-foot Flatcar | 1 —      |
|   | INF BN  | 2               | 89-foot Flatcar | 64       |
|   |         |                 | 60-foot Flatcar | 38       |
|   |         |                 | 68-foot DODX    | 4        |
|   | TANK BN | 2               | 89-foot Flatcar | 51       |
| 60-foot Flatcar   |         |                 | 8               |          |
| 68-foot DODX  |         |                 | 33              |          |
| NLOS CO   | 1       | 89-foot Flatcar | 6               |          |
|   |         | 60-foot Flatcar | 7               |          |
|   |         | 68-foot DODX    | -               |          |
| Brigade Totals  |         |                 | 89-foot Flatcar | 244      |
|   |         |                 | 60-foot Flatcar | 100      |
|   |         |                 | 68-foot DODX    | 74       |
| Legend:<br>HHC: Headquarters, Headquarters Company<br>INF BN: Infantry Battalion<br>TANK BN: Tank Battalion<br>NLOS CO: Non-Line of Sight Company |         |                 |                 |          |

**TABLE 2.2**  
**SUMMARY OF RAILCAR REQUIREMENTS (LIGHT BDE)**

| System   | Unit           | Multiple | Railcar Type    | Quantity |
|--|----------------|----------|-----------------|----------|
| Base Case  | HHC            | 1        | 89-foot Flatcar | 19       |
|  | INF BN         | 3        | 89-foot Flatcar | 12       |
|  | Brigade Totals |          | 89-foot Flatcar | 55       |
| Alternative 1  | HHC            | 1        | 89-foot Flatcar | 19       |
|  | INF BN         | 3        | 89-foot Flatcar | 12       |
|  | NLOS CO        | 1        | 89-foot Flatcar | 10       |
|  | Brigade Totals |          | 89-foot Flatcar | 65       |
| Alternative 2  | HHC            | 1        | 89-foot Flatcar | 19       |
|  | INF BN         | 3        | 89-foot Flatcar | 12       |
|  | NLOS CO        | 1        | 89-foot Flatcar | 11       |
|  | Brigade Totals |          | 89-foot Flatcar | 66       |
| Legend:<br>HHC: Headquarters, Headquarters Company<br>INF BN: Infantry Battalion<br>NLOS CO: Non-Line of Sight Company |                |          |                 |          |

(a) Heavy Brigade. The base case and the FOG-M force require one less C-5 aircraft sortie than the LRSM force. The base case requires ten fewer C-141 aircraft sorties than the FOG-M and twenty-two fewer than the LRSM. Table 2.3 summarizes the number of aircraft sorties required for strategic deployment. Air deployment times are difficult to estimate given the many variables; however, the base case will clearly be the quickest to deploy. Each system requires two Fast Sealift Ships (FSS) or one Large Medium-Speed Roll-On/Roll-Off (RORO) ship to deploy by sea. Sea deployment times do not differ between forces.

(b) Light Brigade. None of the three forces requires C-5 air transport. The base case requires ten fewer C-141 aircraft sorties than the FOG-M and eleven fewer than the LRSM. Table 2.4 summarizes the number of aircraft sorties for tactical air deployment. The base case will require less time to deploy than the two alternatives. Each force requires only one small RORO ship to deploy by sea. Sea deployment times do not differ between systems.

c. (U) Intratheater.

(1) (U) Highway. The FOG-M and LRSM LT are capable of unrestricted highway transport worldwide. The M-16/M172A1/LRSM HVY combination has transport restrictions in most foreign countries due to height, width, and weight. Foreign highway officials will require permits in locations where the system exceeds the highway legal limits.

(2) (U) Tactical Air. The FOG-M, LRSM LT, and LRSM HVY (reduced) are transportable by C-130 aircraft.

(3) (U) Helicopter Transport. The FOG-M and LRSM LT are within the design limitations for external air transport (EAT) by CH-47 helicopters. The LRSM HVY, due to its weight, is not suitable for helicopter transport.

(4) (U) Rail. The FOG-M, LRSM LT, and LRSM HVY are capable of unrestricted rail transport worldwide.

(5) (U) Logistics-Over-the-Shore (LOTS). All systems are transportable on the LARC-LX and larger lighterage vessels of the Army tactical watercraft fleet.

(4) (U) Deployment.

(a) Heavy Brigade. Since none of the three force alternatives is C-130 air transportable and must rely in large part on roadmarch and rail transport to fully accomplish required tactical movements, a Transportability Analysis Reports Generator (TARGET) model analysis was not conducted to determine tactical air requirements.

(b) Light Brigade. The NLOS company has one truck that is not C-130 air transportable and must be transported via roadmarch or rail. The base case requires twenty-one fewer C-130 aircraft sorties than the FOG-M equipped force and twenty-five fewer C-130 aircraft sorties than the LRSM equipped force. Table 2.4 summarizes the number of aircraft sorties required for tactical air deployment.

d. (U) Conclusions. The base case is preferred over the alternatives

**TABLE 2.3**  
**SUMMARY OF AIR SORTIE REQUIREMENTS (HEAVY BRIGADE)**

| System        | Movement Mode            | Aircraft Type | Number of Sorties |        |         |         |     |
|---------------|--------------------------|---------------|-------------------|--------|---------|---------|-----|
|               |                          |               | HHC               | INF BN | TANK BN | NLOS CO | BDE |
| Base Case     | Intertheater (Strategic) | C-141         | 5                 | 90     | 38      | -       | 261 |
|               |                          | C-5           | 1                 | 43     | 70      | -       | 227 |
| Alternative 1 | Intertheater (Strategic) | C-141         | 5                 | 90     | 38      | 8       | 271 |
|               |                          | C-5           | 1                 | 43     | 70      | 4       | 227 |
| Alternative 2 | Intertheater (Strategic) | C-141         | 5                 | 93     | 38      | -       | 283 |
|               |                          | C-5           | 1                 | 43     | 70      | -       | 228 |

**Note:** Allowable Cabin Loads (ACLs) were based on a standard critical leg of 3,000 nautical miles without air refueling.  
ACLs are: C-141 - 50,000 lbs; C-5 - 150,000 lbs. (Reference: Letter, Air Mobility Command, dated 26 Aug 93)

**Legend:**  
HHC: Headquarters, Headquarters Company  
INF BN: Infantry Battalion  
TANK BN: Tank Battalion  
NLOS CO: Non-Line of Sight Company  
BDE: Brigade

**TABLE 2.4**  
**SUMMARY OF AIR SORTIE REQUIREMENTS (LIGHT BRIGADE)**

| System        | Movement Mode            | Aircraft Type | Number of Sorties |        |         |     |
|---------------|--------------------------|---------------|-------------------|--------|---------|-----|
|               |                          |               | HHC               | INF BN | NLOS CO | BDE |
| Base Case     | Intertheater (Strategic) | C-141         | 17                | 10     | -       | 47  |
|               | Intratheater (Tactical)  | C-5           | -                 | -      | -       | -   |
| Alternative 1 | Intertheater (Strategic) | C-130         | 35                | 20     | -       | 95  |
|               | Intratheater (Tactical)  | C-141         | 17                | 10     | 10      | 57  |
| Alternative 2 | Intertheater (Strategic) | C-5           | -                 | -      | -       | -   |
|               | Intratheater (Tactical)  | C-130         | 35                | 20     | 21      | 116 |
|               | Intertheater (Strategic) | C-141         | 17                | 10     | -       | 58  |
|               | Intratheater (Tactical)  | C-5           | -                 | -      | -       | -   |
|               |                          | C-130         | 35                | 21     | -       | 120 |

**Note:** Allowable Cabin Loads (ACLs) were based on a standard critical legs of 3,000 nautical miles for the C-141/C-5 and 500 nautical miles for the C-130 without air refueling. ACLs are: C-141 -50,000 lbs; C-5 150,000 lbs; C-130 - 44,000 lbs. (Reference: Letter, Air Mobility Command, dated 26 Aug 93)

**Legend:**  
HHC: Headquarters, Headquarters Company  
INF BN: Infantry Battalion  
NLOS CO: Non-Line of Sight Company  
BDE: Brigade

since it requires the fewest transport assets to deploy. Of the alternatives, the FOG-M equipped force is preferred because it requires fewer transport assets than the LRSM equipped force, and because the FOG-M has fewer restrictions for transport by highway and air modes.

(1) (U) The FOG-M and LRSM LT are both HHV based systems and are readily transportable by all modes. The larger and heavier LRSM HVY is far less transportable. It will require permits for highway transport and reduction for tactical and strategic air transport. Unlike the other two systems, the LRSM HVY is not transportable by C-130 aircraft or CH-47 helicopters.

(2) (U) The base case is the most effective force for intraCONUS, intertheater and intratheater deployment since it requires the fewest transport assets. Of the two alternatives, the FOG-M equipped force is the more effective system for all deployment legs since it requires fewer transport assets than the LRSM equipped force.

### 3. (U) Methodology.

a. (U) General. The analyses addressed highway, rail, marine, and air transportability for each alternative. The transportability analyses consisted of reviewing each system's weight and dimensional characteristics and comparing them to the capabilities of various transportation assets. Further, the deployability analyses determined how well the base case and each of the alternatives deploy from Fort Benning, Georgia (home base), to the theater of operations, Europe and Southwest Asia (SWA).

#### b. (U) Models/Simulations.

(1) (U) The model used to determine the transportability restrictions for the systems was the Automated Transportability Analysis (AUTOTRAN) model. AUTOTRAN analyzes a materiel system's transport configurations and determines the physical restrictions inherent to moving that system by the highway, rail, marine, and air modes of transport.

(2) (U) The model used to determine the deployability of the systems was the Transportability Analysis Reports Generator (TARGET). TARGET is a Department of the Army approved system of programs and models originally developed in 1978. It provides an automated capability for the retrieval and analysis of data for equipment authorized in organizational elements of the United States Army. TARGET merges unit equipment authorizations with equipment characteristics data to profile units. This allows data manipulations for detailed strategic mobility planning. A sample of data obtained from the system includes unit and force measures such as square feet, short tons, and measurement tons, along with equipment listings, air sortie requirements, and surface transportation requirements.

c. (U) Assumptions. To get a realistic comparison between the alternatives, we assumed all aircraft required to transport the base case, FOG-M, and LRSM brigades were available at the aerial port of embarkation. Although this will not occur when the systems deploy, we made this assumption to ensure the alternatives were analyzed on an equal basis. Movement requirements and deployment times were based on peacetime restrictions with no in-air refueling. We also assumed the new equipment will meet all transportability requirements for safe transport, to include lifting and tiedown requirements.

d. (U) Limitations.

(1) (U) Highway and Rail. Highway and rail networks for most foreign countries are limited. Information on conditions for which foreign countries would permit highway transport of oversized/overweight vehicles is not available. Except for the United States and Europe, data on railcar types and capacities are not available.

(2) (U) Structural Analysis. These analyses do not address the structural integrity of the system or the adequacy of slinging and tiedown provisions.

(3) (U) Defense Transportation System. These analyses do not address the viability of the Defense Transportation System to sustain unit deployment or the availability of transportation assets required for unit movement.

4. (U) Measures of Effectiveness.

The following restrictions/constraints are used to determine which system is the best/least restricted when moving through the Defense Transportation System.

a. (U) Transport Restrictions/Constraints

(1) (U) Highway Transport. The restrictions for highway transport are given below, from least to most restrictive. Meeting highway legal limits will allow the vehicles to move on highways without restriction. Exceeding legal limits, but within highway permit limits, requires the installation to obtain permits for highway movement of the vehicle. It may also require special routing to avoid roads not designed for larger/heavier vehicles. This increases the time required to move the vehicle. It also requires coordination with state/country highway officials. Exceeding the highway permit limit will require special routing and thus increase the trip length and time. It will also require special coordination with highway officials who may decide not to allow the vehicle to move by highway except to the nearest rail loading yard.

(a) (U) Meets highway legal limits in the United States and in foreign countries listed in the International Road Federation (IRF) highway chart - no highway permits required for transport.

(b) (U) Meets legal limits in the United States and in most countries listed in the IRF chart - some highway permits required.

(c) (U) Exceeds legal limits in some states and in some countries in the IRF chart.

(d) (U) Exceeds legal limits in all states (within permit limits) and in all countries in the IRF chart.

(e) (U) Exceeds highway legal and permit limits in the United States.

(2) (U) Rail Transport. Restrictions for rail transport are given below, from least to most restrictive. Meeting rail clearance standards allows the vehicle/system to move by the shortest route to its destination. Exceeding the standards will require route planning by the railroads, circuitous routing,

and delays in the movement of equipment, thereby increasing the cost and deployment time. Compliance with rail clearance diagrams is based on the system loaded on a 50-inch high flatcar.

(a) (U) Meets the rail clearance requirements of the Association of American Railroads (AAR) outline diagram for unrestricted rail transport in CONUS, the Gabarit International de Chargement (GIC) outline diagram for unrestricted rail transport in Europe, and the Saudi Arabia outline diagrams. These outline clearance diagrams apply to single loads, without end overhang, on open-top railcars.

(b) (U) Meets the clearance requirements of the AAR and NATO Envelope B and larger Saudi Arabia diagrams, but exceeds the requirements of the GIC and the smaller Saudi Arabia diagrams. Envelope B is less restrictive than the GIC outline diagram and covers about 85 percent of the rail routes in Europe.

(c) (U) Meets the clearance requirements of the AAR and the larger Saudi diagrams, but exceeds the requirements of the GIC, NATO Envelope B, and the smaller Saudi Arabia diagrams.

(d) (U) Meets the requirements of the Department of Defense (DOD) and larger Saudi Arabia rail clearance diagrams, but exceeds the requirements of the AAR, GIC, NATO Envelope B, and smaller Saudi Arabia diagrams. Meeting the DOD rail clearance diagram allows for unrestricted rail transport over lines in the Strategic Rail Corridor Network (STRACNET) and its connectors to military installations and activities needed for defense readiness. About 22 percent of the standard gauge rail lines in the United States meet the limits of this diagram. The larger Saudi Arabia diagram is for a rail network similar to the U.S. STRACNET.

(e) (U) Exceeds the DOD STRACNET, AAR, GIC, NATO Envelope B, and Saudi Arabia rail clearance diagrams.

(3) (U) Air Transport. Restrictions for air transport are given below, from least to most restrictive. Of the Air Mobility Command's (AMC's) primary cargo aircraft, the C-130 is the most dimensionally restrictive. If equipment is designed to fit in the C-130 aircraft, then it will also fit in the C-141, and C-5 aircraft. This allows the shipper the capability to use all of the primary AMC aircraft for tactical and strategic transport. Table 4.1 shows the restrictions for the C-130, C-141, and C-5.

(a) (U) Meets C-130, C-141, and C-5 aircraft limits.

(b) (U) Meets C-141 and C-5 aircraft limits, but exceeds C-130 aircraft limits.

(c) (U) Meets C-5, but exceeds C-130 and C-141 aircraft limits.

(d) (U) Exceeds C-130, C-141, and C-5 aircraft limits.

(4) (U) Marine Transport. The restrictions for tactical water transport and logistics-over-the-shore (LOTS) are given below, from least to most restrictive. If the components are designed for transport on the smallest vessel, they will be capable of transport on the larger vessels.

**TABLE 4.1**  
**AIR TRANSPORT DIMENSIONAL LIMITS**

| <b>Aircraft</b> | <b>Height<br/>(in.)</b> | <b>Width<br/>(in.)</b> | <b>Length<br/>(in.)</b> |
|-----------------|-------------------------|------------------------|-------------------------|
| <b>C-130</b>    | <b>102</b>              | <b>107</b>             | <b>480</b>              |
| <b>C-141</b>    | <b>103</b>              | <b>111</b>             | <b>1,090</b>            |
| <b>C-5</b>      | <b>156</b>              | <b>216</b>             | <b>1454</b>             |

(a) (U) Meets the requirements of the LARC-LX and larger lighterage vessels of the Army tactical watercraft fleet.

(b) (U) Meets the requirements of the LCU-1466 and larger lighterage vessels of the Army tactical watercraft fleet.

b. (U) Transportation Assets Required for Movement.

(1) (U) Rail Transport - Least number of railcars.

(2) (U) Highway Transport - Least number of heavy/medium equipment transporters (HETs/METs).

(3) (U) Marine Transport - Least number of fast sealift size ships.

(4) (U) Strategic Air Transport - Least number of C-141/C-5 sorties.

(5) (U) Tactical Air Transport - Least number of C-130 sorties.

c. (U) Unit Deployment Time. The best system takes the least time to deploy. We did not look at the capability of the systems to perform their mission, we only looked at deployment times.

5. (U) Analysis and Results. We analyzed the ability of each alternative to be transported/deployed intraCONUS, intertheater, and intratheater.

a. (U) IntraCONUS.

(1) (U) Highway Restrictions/Constraints. The American Trucking Associations, Incorporated publishes dimensional and weight legal limits for highway transport throughout the United States. We have also developed a chart detailing conditions when states will issue movement permits without certification as essential to national defense. Each system was analyzed using this information.

(a) (U) FOG-M. The FOG-M is capable of unrestricted highway transport in CONUS.

(b) (U) LRSM. The LRSM LT is also capable of unrestricted highway transport in CONUS. The M916/M172A1/LRSM HVY combination exceeds the legal width limit for routine highway transport and will require permits for movement in CONUS. Table 5.1 shows the highway restrictions for the LRSM HVY.

(c) (U) Effectiveness. The FOG-M is the most effective system because it does not require permits for highway transport in either the heavy or light brigade scenarios.

(2) (U) Rail Restrictions/Constraints. The Association of American Railroads (AAR) publishes the outline diagram "Single Loads, Without End Overhang, on Open-Top Cars". The Military Traffic Management Command (MTMC) maintains the DOD clearance diagram for rail transport within the STRACNET, which is a network of civil rail lines serving major defense installations. These clearance diagrams are shown in appendix B. We used these diagrams to analyze each system for rail transport.

**TABLE 5.1**  
**SUMMARY OF WORLDWIDE HIGHWAY RESTRICTIONS FOR THE**  
**M916/M172A1/LRSM HVY COMBINATION**

|  | Number of Legal<br>Limits Exceeded in the<br>United States * | Number of Legal<br>Limits Exceeded in<br>Foreign Countries ** |
|--|--|---|
| Overall Combination<br>Length  | 0  | 86  |
| Overall Combination<br>Width   | 51   | 141   |
| Overall Combination<br>Height  | 0  | 12  |
| Truck Single Axle  | 0  | 3   |
| Truck Tandem Axle  | 0  | 11  |
| Bridge Formula   | 0  | 0   |
| Gross Weight<br>on Network   | 0  | 10  |
| Gross Weight<br>off Network  | 0  | N/A   |
| * Out of 50 states and the District of Columbia<br>** Out of 142 countries |  |   |

(a) (U) FOG-M, LRSM LT, and LRSM HVY. All systems meet the AAR outline diagram for unrestricted rail transport in CONUS.

(b) (U) Effectiveness. There is no preferred system because all are equally transportable by rail in CONUS.

(3) (U) IntraCONUS Unit Movement (Required transportation assets by type and quantity, and the time it takes for the unit to travel from origin to the aerial port or seaport of embarkation).

(a) (U) Deployment by Highway. Units deploying from Fort Benning, Georgia will embark at Lawson Airfield. This aerial port of embarkation is adjacent to Fort Benning, so there is no requirement for movement by highway or rail.

(b) (U) Deployment by Rail. Deployment by sea will require CONUS rail transport to a suitable port on the east coast. Deployment times to the port of embarkation include alert, preparation, marshaling, rail loadout, transit, and unloading times. Table 5.2 summarizes deployment to the port of Savannah, Georgia. The limiting factors are rail loadout and transit times, which depend on the distance to the port and the number of railcars and unit trains required for deployment. Tables 2.1 and 2.2 show the number of railcars required to deploy each system.

1. (U) Base Case. The base case heavy brigade requires 405 railcars. The base case light brigade requires 55 railcars.

2. (U) FOG-M. The FOG-M heavy brigade requires 415 railcars. The FOG-M light brigade requires 65 railcars.

3. (U) LRSM. The LRSM heavy brigade requires 418 railcars. The LRSM light brigade requires 66 railcars.

4. (U) Effectiveness. The base case, followed closely by the FOG-M brigade in the heavy and light brigade scenarios, is the most effective system since it requires the fewest railcars to deploy.

b. (U) Intertheater (Strategic Transport).

(1) (U) Strategic Air Transport Restrictions/Constraints. Strategic air transport is accomplished with C-141 and C-5 aircraft. We compared equipment dimensional and weight characteristics with air transport certifications and aircraft transport criteria to determine suitability for strategic air transport. Table 5.3 shows the strategic air transport restrictions for each alternative.

(a) (U) FOG-M, LRSM LT, and LRSM HVY. Each system is within the dimensional and weight limitations of the C-141 and C-5 aircraft. However, the LRSM HVY must be reduced (see table 5.3) for C-141 transport.

(b) (U) Effectiveness. The FOG-M is preferred because it requires no reduction for C-141 transport in either the heavy or light brigade scenarios.

**TABLE 5.2  
CONUS RAIL DEPLOYMENT**

| System<br>Brigade  | Number of<br>Railcars | Deployment Times (Hours)* |             |              |
|--|-----------------------|---------------------------|-------------|--------------|
|  |                       | Loading **                | Transit *** | Unloading ** |
| Heavy Brigade  |                       |                           |             |              |
| Base Case  | 405                   | 41                        | 11          | 41           |
| FOG-M  | 415                   | 42                        | 11          | 42           |
| LRSM   | 418                   | 42                        | 11          | 42           |
| Light Brigade  |                       |                           |             |              |
| Base Case  | 55                    | 6                         | 11          | 6            |
| FOG-M  | 65                    | 7                         | 11          | 7            |
| LRSM   | 66                    | 7                         | 11          | 7            |
| Legend:<br>FOG-M: Fiber Optic Guided Missile<br>LRSM: Long Range Smart Mortar<br>* Based on optimum conditions not considering alert, preparation, or marshalling times.<br>** Based on an average of 6 hours per 10 car string (loading 6 strings concurrently using end ramps and circus loading).<br>*** Based on an average speed of 22 miles per hour over 750 miles distance for unit trains of 50 or more cars. |                       |                           |             |              |

**TABLE 5.3**  
**SUMMARY OF RESTRICTIONS FOR STRATEGIC AIR TRANSPORT**

| System  | C-141  | C-5 and C-17     |
|---|--|------------------|
| FOG-M   | No restrictions.   | No restrictions. |
| LRSM LT   | No restrictions.   | No restrictions. |
| LRSM HVY  | Reduce width to < 106 in. *<br>and height to < 79.5 in. ** | No restrictions. |
| <b>Legend:</b><br>FOG-M: Fiber Optic Guided Missile<br>LRSM LT: Long Range Smart Mortar Light<br>LRSM HVY: Long Range Smart Mortar Heavy<br>* Remove mortar base plate.<br>** Remove machine gun. |  |                  |

(2) (U) Strategic Marine Transport. Strategic materiel transport vessels include breakbulk, container, barge carriers, and roll-on/roll-off (RORO) ships. Marine transport is the least restricted mode of transport.

(a) (U) FOG-M, LRSM LT, and LRSM HVY. Each alternative is transportable by all strategic materiel transport vessels used by the Army.

(b) (U) Effectiveness. There is no preferred system because all are equally transportable by Army strategic materiel transport vessels.

(3) (U) Intertheater Unit Movement (Required transportation assets by type and quantity, and the time it takes for the unit to travel from port of embarkation to port of debarkation)

(a) (U) Deployment by Air. Strategic air deployment times from Lawson airfield to SWA are based on aircraft loading times, flight times, and unloading times of C-141 and C-5 aircraft taken from Air Force planning factors. Table 5.4 shows distances, allowable aircraft cabin loads, and one-way single-sortie deployment times under optimum conditions. Actual deployment times will take longer, but are impossible to predict. Provided delaying factors such as bad weather are equal for all systems, the limiting factors in deployment times are the number of aircraft required and the number of aircraft available. Tables 2.3 and 2.4 show the number of air sorties and type of aircraft required to deploy each force.

1. (U) Base Case. The base case heavy brigade requires 488 aircraft sorties to deploy to SWA, 227 of which are C-5's. The base case light brigade requires 47 aircraft sorties to deploy to SWA, none of which are C-5's.

2. (U) FOG-M. The FOG-M heavy brigade requires 498 aircraft sorties to deploy to SWA, of which 227 are C-5's. The FOG-M light brigade requires 57 aircraft sorties to deploy to SWA, none of which are C-5's.

3. (U) LRSM. The LRSM heavy brigade requires 511 aircraft sorties to deploy to SWA, of which 228 are C-5's. The LRSM light brigade requires 58 aircraft sorties to deploy to SWA, none of which are C-5's.

4. (U) Effectiveness. The base case, followed closely by the FOG-M brigade in the heavy brigade scenario, is the most effective system since it requires the fewest aircraft sorties to deploy. The base case in the light brigade scenario is the most effective systems since it requires fewer aircraft sorties than the FOG-M and LRSM brigades to deploy.

(b) (U) Deployment by Sea. Strategic sea deployment times include marshalling at the port, ship loading, transit, and discharge times. Deployment times vary depending on the type of shipping available. Each of the three alternatives require just two fast sealift ships to deploy in the heavy brigade scenario and only one small RORO to deploy in the light brigade scenario. Average deployment time for a FSS from Savannah, Georgia to SWA is 37 days, while the average deployment time for a small RORO is 17 days. This includes 2 days loading and 2 days discharge time. There are no differences in deployment times between systems in either scenario.

**TABLE 5.4**  
**STRATEGIC AIR DEPLOYMENT**

| Destination  | Longest<br>Flight Distance<br>(No Aerial Refueling) | Aircraft<br>Type | Allowable<br>Cabin Load       | Deployment<br>Time * |
|--|---|------------------|-------------------------------|----------------------|
| Southwest<br>Asia  | 3300<br>Nautical Miles                              | C-141<br><br>C-5 | 50,000 lbs<br><br>150,000 lbs | 32 hours **          |
| <p>* Includes loading, unloading, and one-way flight times with intermodal stops.<br/> ** Single-sortie deployment time is the same for all 3 forces.<br/> Note: Recent data received from Air Mobility Command provided the ACLs for use with the SWA scenario.</p> |   |                  |                               |                      |

c. (U) Intratheater (Tactical Transport).

(1) (U) Highway Restrictions/Constraints. The International Road Federation (IRF) publishes legal limits governing highway transport throughout 142 foreign countries. Information on conditions for which foreign countries will issue permits is not available. We used the IRF publication to evaluate highway transportability. In general, restrictions to highway transport will be more numerous than those encountered in the United States. In SWA, movement must be determined on a country-by-country basis.

(a) (U) FOG-M. The FOG-M is capable of unrestricted highway transport worldwide.

(b) (U) LRSM. The LRSM LT is capable of unrestricted highway transport worldwide. The M916/M172A1/LRSM HVY combination exceeds the legal limits for routine highway transport and requires permits in most countries. Local officials must be contacted to determine exact restrictions to movement. Transport may require circuitous routing, resulting in delaying the availability of the system at its destination. Table 5.1 shows the number of foreign country highway restrictions for the LRSM HVY.

(c) (U) Effectiveness. The FOG-M is preferred over the LRSM because it does not require permits for routine highway transport in either the heavy or light brigade scenarios.

(2) (U) Tactical Airlift.

(a) (U) C-130 Restrictions/Constraints. Tactical air transport is accomplished by C-130 aircraft. We compared equipment dimensions and weight characteristics with air transport criteria to determine suitability for tactical air transport. Table 5.5 shows the tactical fixed-wing restrictions for each alternative.

(1) (U) FOG-M. The FOG-M requires no special preparation for C-130 transport.

(2) (U) LRSM. The LRSM LT requires no special preparation for C-130 transport. The LRSM HVY must be reduced in height and width for C-130 transport as indicated in Table 5.5.

(3) (U) Effectiveness. The FOG-M is preferred over the LRSM because it requires no special preparation for C-130 transport in either the heavy or light brigade scenarios.

(b) (U) UH-60/CH-47 Helicopter Restrictions/Constraints, External Lift. The UH-60 and CH-47 Helicopters provide limited tactical air movement of forces when airfields are not available. Helicopter transport certifications and equipment dimensional and weight characteristics were compared with helicopter operational lift capabilities to determine suitability for transport. We do not consider structural suitability of the equipment.

(1) (U) FOG-M. The FOG-M can be transported by the UH-60 and CH-47 helicopters. The Natick Research, Development and Engineering Center (NATICK) has concerns about the helicopter slings rubbing against the fire unit of the FOG-M during flight. NATICK may require a flight test before certifying the FOG-M for external air transport (EAT).

**TABLE 5.5**  
**SUMMARY OF RESTRICTIONS FOR FIXED WING TACTICAL AIR TRANSPORT**

| <b>System</b>  | <b>Restrictions for C-130 Transport</b>                 |
|--|---|
| <b>FOG-M</b>   | No restrictions.  |
| <b>LRSM LT</b>   | No restrictions.  |
| <b>LRSM HVY</b>  | Reduce width to < 106 in. * and height to < 79.5 in. ** |
| <b>Legend:</b><br><b>FOG-M:</b> Fiber Optic Guided Missile<br><b>LRSM LT:</b> Long Range Smart Mortar Light<br><b>LRSM HVY:</b> Long Range Smart Mortar Heavy<br>* Remove mortar base plate.<br>** Remove machine gun. |   |

(2) (U) LRSM. The LRSM LT is within the design limitations of UH-60 and CH-47 helicopters for EAT. The LRSM HVY exceeds the maximum weight limits for EAT by UH-60 and CH-47 helicopters.

(3) (U) Effectiveness. The FOG-M is preferred over the LRSM because it is transportable by UH-60 and CH-47 helicopters in either the heavy or light brigade scenarios.

(3) (U) NATO Rail Restrictions/Constraints. NATO standardization agreement (STANAG) 2832, Restrictions for the Transport of Military equipment by Rail on European Railways, regulates rail transport of military equipment in NATO countries. The GIC clearance diagram establishes dimensional restrictions for unrestricted rail transport. The Envelope B clearance diagram establishes preplanned routing for equipment exceeding the GIC diagram. These diagrams are shown in appendix B.

(a) (U) FOG-M and LRSM. Each system meets the GIC clearance diagram for unrestricted rail transport worldwide.

(b) (U) Effectiveness. There is no preferred system because all are equally transportable by rail worldwide.

(4) (U) OCONUS Rail Restrictions/Constraints. Limited information is available on rail networks outside of NATO countries. However, MTMCTEA has access to rail clearance diagrams from Saudi Arabia (see appendix B). These clearance diagrams are somewhat dated (1983), but serve as analytical tools to determine dimensional restrictions military equipment might encounter during rail movement. The larger Saudi Arabian rail clearance diagram allows for rail transport on a network of strategic rail lines in Saudi Arabia (similar to U.S. STRACNET). It should be noted that after action reports show limited rail shipments of military equipment in Saudi Arabia during Desert Shield/Storm because of a lack of railcars of sufficient capacity and/or quantity to accommodate military equipment. Specific information on rail service in other non-NATO countries is not available; however, rail assets of sufficient capacity and quantity may also not be available. Movement must be coordinated with host nation officials.

(a) (U) FOG-M and LRSM. Each system is capable of unrestricted rail transport worldwide.

(b) (U) Effectiveness. There is no preferred system because all are equally transportable by rail worldwide.

(5) (U) LOTS. LOTS operations involve transferring military equipment and supplies from cargo vessels offshore in support of military forces ashore. Army landing craft include the lighter amphibious resupply cargo (LARC)-LX, landing craft mechanized (LCM-8), and landing craft utility (LCU)-1466, -1646, and -2000 class.

(a) (U) FOG-M and LRSM. All systems can be transported on the LARC-LX and larger vessels.

(b) (U) Effectiveness. There is no preferred system because all are equally transportable by Army landing craft.

(6) (U) Intratheater Unit Movement (Required transportation assets by type and quantity for the base case and both alternatives).

Actual intratheater deployment times are difficult to predict and can be extended due to adverse circumstances. Since the alternatives are so close in transport requirements, intratheater deployment times will be similar for all three forces in both the heavy and light brigade configurations. The force requiring the least number of transport assets will be considered the most effective.

(a) Deployment by Highway. The optimum outcome is to have the fewest transport requirements for intratheater deployment. Tables 5.6 and 5.7 summarizes transport asset requirements to deploy the forces via intratheater motor/convoy (roadmarch) movement. It should be noted that M870s are organic to construction units and may not be available for tactical deployments, and also that the differences between the M870 equivalents and the M916/M172A1 combination are insignificant for the purposes of this analysis.

1. (U) Base Case. The base case heavy brigade requires 329 HETS and 110 M870 equivalents in addition to the self propelled and towed convoy vehicles. The base case light brigade requires 49 M870 equivalents in addition to the convoy vehicles.

2. (U) FOG-M. The alternative one heavy brigade requires 329 HETS and 111 M870 equivalents in addition to the convoy vehicles. The alternative one light brigade requires 50 M870 equivalents in addition to the convoy vehicles.

3. (U) LRSM. The alternative two heavy brigade requires 342 HETS and 115 M870 equivalents in addition to the convoy vehicles. The alternative two light brigade requires 50 M870 equivalents in addition to the convoy vehicles.

4. (U) Effectiveness. The differences between the base case and the two alternatives are insignificant for intratheater motor/convoy transport requirements. Deployment to the tactical assembly area will be the same for all three forces for both the heavy and light brigades.

6. (U) Conclusions. Although, there is no difference in the transportability restrictions/constraints between the FOG-M and LRSM LT, the LRSM hvY experiences restrictions for highway and air transport modes. Therefore, the FOG-M is the preferred system in the heavy brigade scenario. In the light brigade scenario the FOG-M and LRSM are equally transportable.

The differences in deployability of the base case and alternative forces is small. However, the base case requires the fewest transport assets to deploy. Of the alternatives, alternative 1 is the more deployable force since it requires the fewest transport assets in the heavy brigade scenario.

(a) (U) IntraCONUS Movement.

(1) (U) For intraCONUS movement, the FOG-M and LRSM LT encounter no restrictions for highway and rail transport. The LRSM HVY, when transported by the M916/M172A1 combination, will require permits in all states for highway transport. The LRSM HVY is capable of unrestricted rail transport in CONUS.

**TABLE 5.6**  
**INTRATHEATER HIGHWAY REQUIREMENTS (HEAVY BDE)**

| Force  | Highway/Convoy Transport Assets |      |                |                 |
|--|---------------------------------|------|----------------|-----------------|
|  | M870<br>(METS)                  | HETS | CONVOY<br>(SP) | CONVOY<br>TOWED |
| Base Case  | 110                             | 329  | 473            | 266             |
| FOG-M  | 111                             | 329  | 508            | 267             |
| LRSM   | 115                             | 342  | 486            | 270             |
| <b>Legend:</b><br><b>METS: Medium Equipment Transporters</b><br><b>HETS: Heavy Equipment Transporters</b><br><b>SP: Self Propelled</b><br><b>FOG-M: Fiber Optic Guided Missile</b><br><b>LRSM: Long Range Smart Mortar</b> |                                 |      |                |                 |

**TABLE 5.7**  
**INTRATHEATER HIGHWAY REQUIRMENTS (LIGHT BDE)**

| Force  | Highway/Convoy Transport Assets |      |                |                 |
|--|---------------------------------|------|----------------|-----------------|
|  | M870<br>(METS)                  | HETS | CONVOY<br>(SP) | CONVOY<br>TOWED |
| Base Case  | 49                              | -    | 143            | 51              |
| FOG-M  | 50                              | -    | 178            | 52              |
| LRSM   | 50                              | -    | 178            | 64              |
| <b>Legend:</b><br><b>METS: Medium Equipment Transporters</b><br><b>HETS: Heavy Equipment Transporters</b><br><b>SP: Self Propelled</b><br><b>FOG-M: Fiber Optic Guided Missile</b><br><b>LRSM: Long Range Smart Mortar</b> |                                 |      |                |                 |

(2) (U) The base case requires the fewest assets for highway and rail deployment in CONUS. Of the alternatives, alternative 1 requires fewer transportation assets.

(b) (U) Intertheater Movement.

(1) (U) For intertheater movement, the FOG-M and LRSM LT encounter no restrictions for air transport. The LRSM HVY requires reduction in height and width (see table 5.3) for C-141 transport. There are no restrictions for marine transport of these systems.

(2) (U) The base case and each alternative require the same number of FSS or Large Medium-Speed RORO ships to deploy. The base case requires fewer C-141 and C-5 aircraft sorties to deploy than either alternative. Alternative 1 requires fewer C-141 and C-5 aircraft sorties than alternative 2.

(c) (U) Intratheater Movement.

(1) (U) For intratheater movement, the FOG-M encounters no restrictions for highway transport. While the LRSM LT is capable of unrestricted highway transport, the LRSM HVY will encounter significant restrictions that may require circuitous routing. Unlike the FOG-M and LRSM LT, the LRSM HVY requires reduction for C-130 transport and is not transportable by UH-60 or CH-47 helicopters. All systems are capable of unrestricted rail transport.

(2) (U) Although the base case requires the fewest transportation assets for motor/convoy, the differences between it and the alternatives are insignificant.

APPENDIX A

(U) TABLE OF ORGANIZATION AND EQUIPMENT

BASE CASE

(HEAVY)

Date - 18-OCT-93

## UNIT EQUIPMENT LIST

Page

1

INF BN (MECH)

SRC - 07245L000

Authorized Personnel Strength - 810

2 Multiples of Unit in Force

| Item   | NDX | Nomenclature        | Model      | Component Description | Auth Qty | Veh | Length (IN) | Width (IN) | Height (IN) | Weight (LBS) | Square Feet | Short Tons | Measure Tons |
|--------|-----|---------------------|------------|-----------------------|----------|-----|-------------|------------|-------------|--------------|-------------|------------|--------------|
| A79381 | 01  | ANTENNA GROUP       | OE-254(1)G |                       | 32       |     | 43          | 40         | 40          | 48           | 382         | 1          | 32           |
| M0990  | 02  | CARRIER: MORTAR SY  | M1064      |                       | 6        | NR  | 210         | 106        | 80          | 27635        | 927         | 83         | 155          |
| M8234  | 02  | CARRIER PERSONNEL   | M113A3     |                       | 17       | NR  | 208         | 100        | 81          | 23880        | 2456        | 203        | 414          |
| L32887 | 02  | CLEAMER STM WHL MT  | NONE       |                       | 1        | R   | 100         | 72         | 89          | 2780         | 50          | 1          | 9            |
| D11538 | 02  | CARRIER COND P FTR  | M577A1     |                       | 5        | NR  | 192         | 100        | 104         | 22415        | 667         | 56         | 144          |
| M6896  | 04  | COMBAT VEH IMP TOW  | M901A1     |                       | 12       | NR  | 189         | 100        | 102         | 30000        | 1575        | 180        | 335          |
| M9242  | 03  | COMP RCP AIR PUR D  | C-20X-80/6 |                       | 1        |     | 65          | 25         | 40          | 610          | 11          |            | 1            |
| F40375 | 01  | FIGHTING VEHICLE H  | M2A2       |                       | 58       | NR  | 258         | 140        | 120         | 65692        | 14548       | 1905       | 3637         |
| M0462  | 01  | FIGHTING VEHICLE F  | M3A1       |                       | 2        | NR  | 258         | 126        | 117         | 48896        | 452         | 49         | 110          |
| M0530  | 01  | FIGHTING VEHICLE H  | M3A2       |                       | 4        | NR  | 258         | 140        | 120         | 66027        | 1003        | 132        | 251          |
| G11966 | 01  | GEN SET: DED SKD M  | MEP 802A   |                       | 1        |     | 50          | 32         | 36          | 825          | 11          |            | 1            |
| M35813 | 01  | GEN SET DED SKW     | MEP 002A   |                       | 1        |     | 51          | 32         | 36          | 940          | 11          |            | 1            |
| M4862  | 16  | HEATER DUCT TYPE P  | VB67-GFC3  |                       | 1        |     | 56          | 33         | 55          | 450          | 13          |            | 1            |
| M28601 | 01  | FIELD FEEDING KIT   | COMPANY LV |                       | 5        | R   | 254         | 91         | 93          | 5480         | 803         | 14         | 155          |
| L28351 | 03  | KITCHEN FIELD TLR   | MFK75A     |                       | 4        | R   | 178         | 93         | 94          | 4200         | 460         | 8          | 90           |
| M08405 | 01  | BMS-120TOMEDLTNORT  | K6A1       |                       | 6        | R   | 95          | 60         | 45          | 720          | 238         | 2          | 22           |
| M4154  | 02  | RANGE OUTFIT FIELD  | M59        |                       | 8        |     | 27          | 24         | 42          | 253          | 36          | 1          | 3            |
| M50681 | 04  | RECOVERY VEH FTRAC  | M88A1      |                       | 7        | NR  | 323         | 144        | 124         | 107840       | 2261        | 377        | 584          |
| M56742 | 02  | REEL EQUIPMENT      |            | STAND                 | 68       |     | 6           | 24         | 36          | 32           | 68          | 1          | 5            |
| M3399  | 04  | SANITATION CENTER   |            | DRAIN TABLE           | 4        |     | 49          | 27         | 38          | 41           | 37          |            | 3            |
| M33399 | 08  | SANITATION CENTER   |            | WORK TABLE            | 4        |     | 56          | 26         | 38          | 57           | 40          |            | 3            |
| T00161 | 01  | TEST STAND ENGINE   | NONE       |                       | 1        |     | 92          | 48         | 23          | 666          | 31          |            | 1            |
| M0474  | 01  | SHELTER SYS TLR MT  | M51        |                       | 2        | R   | 168         | 85         | 96          | 5360         | 198         | 5          | 40           |
| M89518 | 02  | TRUCK CARGO 10T 8X  | M977WMM    |                       | 5        | R   | 401         | 96         | 101         | 38800        | 1337        | 97         | 281          |
| T59278 | 02  | TRUCK CARGO 10 T 8  | M977 WMM   |                       | 8        | R   | 401         | 96         | 101         | 38800        | 2139        | 155        | 450          |
| M61494 | 04  | TRK UTIL CRG/TRP C  | M998       |                       | 32       | R   | 181         | 84         | 53          | 5280         | 3379        | 84         | 373          |
| M3093  | 02  | TRUCK WRECKER 8X8   | M984 W/W   |                       | 1        | R   | 384         | 101        | 101         | 43180        | 269         | 22         | 57           |
| T87243 | 02  | TRK TANK 2500 GAL   | M978 WMM   |                       | 8        | R   | 401         | 96         | 101         | 38165        | 2139        | 153        | 450          |
| M68441 | 02  | TENT FRAME TYPE MA  |            | FRAME SECTIONS        | 1        |     | 133         | 29         | 26          | 605          | 27          |            | 1            |
| M68441 | 03  | TENT FRAME TYPE MA  |            | FRAME SECTIONS        | 1        |     | 188         | 21         | 21          | 615          | 27          |            | 1            |
| M68441 | 04  | TENT FRAME TYPE MA  |            | FRAME SECTIONS        | 3        |     | 134         | 12         | 25          | 274          | 34          |            | 2            |
| M32593 | 02  | SHOP EQUIP AUTHV L  |            | MULTIPLE ITEMS        | 5        |     | 70          | 40         | 36          | 1002         | 97          | 3          | 7            |
| M32730 | 01  | SHOP EQUIP AUTHV L  | S/E AUTO C |                       | 1        |     | 167         | 87         | 84          | 4460         | 101         | 2          | 18           |
| M68391 | 04  | WLD SHOP TLR MTD    | NONE       |                       | 1        | R   | 179         | 96         | 97          | 7355         | 119         | 4          | 24           |
| M65747 | 05  | TOOL KIT VEH FTRAC  |            | WELDER                | 1        |     | 64          | 37         | 37          | 1130         | 16          | 1          | 1            |
| M68825 | 23  | TRAILER TANK WATER  | M149A2     |                       | 10       | R   | 162         | 81         | 81          | 2912         | 911         | 15         | 154          |
| M30009 | 02  | TRUCK CARGO 2 1/2   | M35A2      |                       | 2        | R   | 265         | 96         | 81          | 13180        | 353         | 13         | 60           |
| M40146 | 02  | TRUCK CARGO 2-1/2   | M35A2 WMM  |                       | 6        | R   | 279         | 96         | 81          | 13570        | 1116        | 41         | 188          |
| M60794 | 15  | TRK CGO D/S 5 TON   | M923A1     |                       | 4        | R   | 311         | 97         | 94          | 22175        | 838         | 44         | 164          |
| M6157  | 01  | ARMED MAINTENANCE V | NONE       |                       | 6        | NR  | 283         | 117        | 116         | 56000        | 1380        | 168        | 333          |
| M36068 | 01  | TRAILER CARGO 2 1/  | LMTV       |                       | 34       | R   | 209         | 96         | 58          | 2491         | 4737        | 42         | 572          |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

Date - 18-OCT-93

UNIT EQUIPMENT LIST

Page

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INF BN (MECH)

SRC - 07245L000

Authorized Personnel Strength - 810

2 Multiples of Unit in Force

| LN     | NDX | Nomenclature              | Model      | Component<br>Description | Auth<br>Qty | Veh | Length<br>(IN) | Width<br>(IN) | Height<br>(IN) | Weight<br>(LBS) | Square<br>Feet | Short<br>Tons | Measure<br>Tons |
|--------|-----|---------------------------|------------|--------------------------|-------------|-----|----------------|---------------|----------------|-----------------|----------------|---------------|-----------------|
| 10337  | 08  | TRUCK CARGO 5 TON         | MTV LWB W/ |                          | 4           | R   | 352            | 96            | 102            | 33613           | 939            | 67            | 199             |
| 240430 | 02  | TRUCK CARGO 2 1/2         | 4X4 LMTV W |                          | 32          | R   | 254            | 96            | 102            | 24013           | 5419           | 384           | 1151            |
| 00712  | 01  | TRLR CGO MTV W/DPS        | NONE       |                          | 21          | R   | 220            | 96            | 58             | 4733            | 3080           | 50            | 372             |
| 03558  | 08  | TRUCK CARGO MTV LW        | W/MHE W/E  |                          | 10          | R   | 386            | 96            | 102            | 37314           | 2573           | 187           | 547             |
| 294047 | 02  | TRUCK TANK                | POL MTV W/ |                          | 7           | R   | 314            | 96            | 102            | 26130           | 1465           | 91            | 311             |
| 294433 | 02  | TRUCK WRECKER             | MTV W/W W/ |                          | 1           | R   | 352            | 96            | 102            | 34826           | 235            | 17            | 50              |
| 2222X  | 99  | Total Accompanying Supply | --         |                          |             |     |                |               |                | 177674          | 1111           | 89            | 222             |
| 2222Y  | 99  | Total Ammunition          | -----      |                          |             |     |                |               |                | 10287           | 25             | 5             | 5               |
| 22222  | 99  | Total Aggregate TOE *     | ---        |                          |             |     |                |               |                | 233308          | 1736           | 117           | 347             |
|        |     |                           |            |                          |             |     |                |               |                |                 | 61880          | 4872          | 12342           |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

## TANK BATTALION (HVV DIV)

SRC - 17375L000

Authorized Personnel Strength - 587

2 Multiples of Unit in Force

| NDX     | Nomenclature                  | Model      | Component Description | Auth Qty | Veh | Length (IN) | Width (IN) | Height (IN) | Weight (LBS) | Square Feet | Short Tons | Measure Tons |
|---------|-------------------------------|------------|-----------------------|----------|-----|-------------|------------|-------------|--------------|-------------|------------|--------------|
| 381 01  | ANTENNA GROUP                 | OE-254(1)G |                       | 21       |     | 43          | 40         | 40          | 48           | 251         | 1          | 21           |
| 990 02  | CARRIER: MORTAR SY            | M1064      |                       | 6        | NR  | 210         | 106        | 80          | 27635        | 927         | 83         | 155          |
| 234 02  | CARRIER PERSONNEL             | M113A3     |                       | 13       | NR  | 208         | 100        | 81          | 23880        | 1878        | 155        | 317          |
| 887 02  | CLEANER STN WHL MT            | NONE       |                       | 1        | R   | 100         | 72         | 89          | 2780         | 50          | 1          | 9            |
| 538 02  | CARRIER COND P FTR            | M577A1     |                       | 5        | NR  | 192         | 100        | 104         | 22415        | 667         | 56         | 144          |
| 242 03  | COMP RCP AIR PWR D            | C-20X-80/6 |                       | 1        |     | 65          | 25         | 40          | 610          | 11          |            | 1            |
| 485 01  | FEEDER SYS ELECT              | 3PH 40AMP  |                       | 2        |     | 60          | 36         | 36          | 400          | 30          |            | 2            |
| 621 01  | FEEDER SYS ELECT              | 3PH 100AMP |                       | 1        |     | 84          | 48         | 48          | 700          | 28          |            | 3            |
| 530 01  | FIGHTING VEHICLE H            | M3A2       |                       | 6        | NR  | 258         | 140        | 120         | 66027        | 1505        | 198        | 376          |
| 813 01  | GEN SET DED 5KW               | MEP 002A   |                       | 2        |     | 51          | 32         | 36          | 940          | 23          | 1          | 2            |
| 862 16  | HEATER DUCT TYPE P            | V867-GFC3  |                       | 1        |     | 56          | 33         | 55          | 450          | 13          |            | 1            |
| 601 01  | FIELD FEEDING KIT             | COMPANY LV |                       | 4        | R   | 254         | 91         | 93          | 5480         | 642         | 11         | 124          |
| 351 03  | KITCHEN FIELD TLR             | MFK75A     |                       | 3        | R   | 178         | 93         | 94          | 4200         | 345         | 6          | 68           |
| 405 01  | BMS-120TOWEDLTWORT            | K6A1       |                       | 6        | R   | 95          | 60         | 45          | 720          | 238         | 2          | 22           |
| 154 02  | RANGE OUTFIT FIELD            | M59        |                       | 6        |     | 27          | 24         | 42          | 253          | 27          | 1          | 2            |
| 681 04  | RECOVERY VEH FTRAC            | M88A1      |                       | 7        | NR  | 323         | 144        | 124         | 107840       | 2261        | 377        | 584          |
| 742 02  | REEL EQUIPMENT                |            | STAND                 | 38       |     | 6           | 24         | 36          | 32           | 38          | 1          | 3            |
| 399 04  | SANITATION CENTER             |            | DRAIN TABLE           | 3        |     | 49          | 27         | 38          | 41           | 28          |            | 2            |
| 399 08  | SANITATION CENTER             |            | WORK TABLE            | 3        |     | 56          | 26         | 38          | 57           | 30          |            | 2            |
| 161 01  | TEST STAND ENGINE             | NONE       |                       | 1        |     | 92          | 48         | 23          | 666          | 31          |            | 1            |
| 474 01  | SHELTER SYS TLR MT            | M51        |                       | 2        | R   | 168         | 85         | 96          | 5360         | 198         | 5          | 40           |
| 518 02  | TRUCK CARGO 10T 8X            | M977WMM    |                       | 5        | R   | 401         | 96         | 101         | 38800        | 1337        | 97         | 281          |
| 278 02  | TRUCK CARGO 10 T 8            | M977 WOWN  |                       | 10       | R   | 401         | 96         | 101         | 38800        | 2673        | 194        | 563          |
| 494 04  | TRK UTIL CRG/TRP C            | M998       |                       | 30       | R   | 181         | 84         | 53          | 5280         | 3167        | 79         | 350          |
| 093 02  | TRUCK WRECKER 8X8             | M984 W/W   |                       | 1        | R   | 384         | 101        | 101         | 43180        | 269         | 22         | 57           |
| 243 02  | TRK TANK 2500 GAL             | M978 WOWN  |                       | 23       | R   | 401         | 96         | 101         | 38165        | 6149        | 439        | 1294         |
| 883 02  | TRAILER FLATBED 5             | M1061A1    |                       | 1        | R   | 223         | 98         | 40          | 5850         | 152         | 3          | 13           |
| 141 53  | TANK&PUMP UNIT LIQ            |            | TANK                  | 2        |     | 72          | 61         | 52          | 475          | 61          |            | 7            |
| 141 54  | TANK&PUMP UNIT LIQ            |            | PUMP                  | 1        |     | 79          | 32         | 50          | 800          | 18          |            | 2            |
| 950 01  | TANK UNIT LIQ DSPH TK LIQ DIS |            |                       | 1        |     | 73          | 61         | 56          | 410          | 31          |            | 4            |
| 441 02  | TENT FRAME TYPE MA            |            | FRAME SECTIONS        | 1        |     | 133         | 29         | 26          | 605          | 27          |            | 1            |
| 441 03  | TENT FRAME TYPE MA            |            | FRAME SECTIONS        | 1        |     | 188         | 21         | 21          | 615          | 27          |            | 1            |
| 441 04  | TENT FRAME TYPE MA            |            | FRAME SECTIONS        | 3        |     | 134         | 12         | 25          | 274          | 34          |            | 2            |
| 730 01  | SHOP EQUIP AUTHV L S/E AUTO C |            |                       | 1        |     | 167         | 87         | 84          | 4460         | 101         | 2          | 18           |
| 391 04  | WLD SHOP TLR MTD              | NONE       |                       | 1        | R   | 179         | 96         | 97          | 7355         | 119         | 4          | 24           |
| 747 05  | TOOL KIT VEH FTRAC            |            | WELDER                | 1        |     | 64          | 37         | 37          | 1130         | 16          | 1          | 1            |
| 811 02  | TRAILER CARGO 1-1/            | M105A2     |                       | 19       | R   | 166         | 83         | 55          | 2670         | 1818        | 25         | 208          |
| 825 23  | TRAILER TANK WATER            | M149A2     |                       | 8        | R   | 162         | 81         | 81          | 2912         | 729         | 12         | 123          |
| 009 02  | TRUCK CARGO 2 1/2             | M35A2      |                       | 22       | R   | 265         | 96         | 81          | 13180        | 3887        | 145        | 656          |
| 146 02  | TRUCK CARGO 2-1/2             | M35A2 WMM  |                       | 5        | R   | 279         | 96         | 81          | 13570        | 930         | 34         | 157          |
| 1794 15 | TRK CGO D/S 5 TON             | M923A1     |                       | 5        | R   | 311         | 97         | 94          | 22175        | 1047        | 55         | 205          |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

## TANK BATTALION (HVV DIV)

SRC - 17375L000

Authorized Personnel Strength - 587

2 Multiples of Unit in Force

| NDX    | Nomenclature                 | Model | Component<br>Description | Auth<br>Qty | Veh | Length<br>(IN) | Width<br>(IN) | Height<br>(IN) | Weight<br>(LBS) | Square<br>Feet | Short<br>Tons | Measure<br>Tons |
|--------|------------------------------|-------|--------------------------|-------------|-----|----------------|---------------|----------------|-----------------|----------------|---------------|-----------------|
| 157 01 | ARMED MAINTENANCE V NONE     |       |                          | 4           | NR  | 283            | 117           | 116            | 56000           | 920            | 112           | 222             |
| 130 02 | TRUCK CARGO 2 1/2 4X4 LMTV W |       |                          | 4           | R   | 254            | 96            | 102            | 24013           | 677            | 48            | 144             |
| 158 04 | TANK COMBAT FULL T M1A1E2    |       |                          | 58          | NR  | 360            | 144           | 114            | 123780          | 20880          | 3590          | 4959            |
| 133 02 | TRUCK WRECKER MTV W/W W/     |       |                          | 1           | R   | 352            | 96            | 102            | 34826           | 235            | 17            | 50              |
| 12X 99 | Total Accompanying Supply -- |       |                          |             |     |                |               |                | 128758          | 805            | 64            | 161             |
| 12Y 99 | Total Ammunition -----       |       |                          |             |     |                |               |                | 7455            | 18             | 4             | 4               |
| 12Z 99 | Total Aggregate TOE * ---    |       |                          |             |     |                |               |                | 188749          | 1276           | 94            | 255             |
|        |                              |       |                          |             |     |                |               |                |                 | 56623          | 5944          | 11641           |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

Date - 18-OCT-93

## UNIT EQUIPMENT LIST

Page

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MHC INF DIV (MECH) BDE

SRC - 87042L200

Authorized Personnel Strength - 85

1 Multiples of Unit in Force

| NDX       | Nomenclature              | Model      | Component Description | Auth Qty | Veh | Length (IN) | Width (IN) | Height (IN) | Weight (LBS) | Square Feet | Short Tons | Measure Tons |
|-----------|---------------------------|------------|-----------------------|----------|-----|-------------|------------|-------------|--------------|-------------|------------|--------------|
| A79381 01 | ANTENNA GROUP             | OE-254(1)G |                       | 11       |     | 43          | 40         | 40          | 48           | 131         |            | 11           |
| 234 02    | CARRIER PERSONNEL         | M113A3     |                       | 1        | NR  | 208         | 100        | 81          | 23880        | 144         | 12         | 24           |
| 2887 02   | CLEANER STM WNL MT        | NONE       |                       | 1        | R   | 100         | 72         | 89          | 2780         | 50          | 1          | 9            |
| D11538 02 | CARRIER COMD P FTR        | M577A1     |                       | 1        | NR  | 192         | 100        | 104         | 22415        | 133         | 11         | 29           |
| E55553 01 | DISTR/ILLUM SET EL        | 1PH/60AMP  |                       | 1        |     | 60          | 36         | 36          | 400          | 15          |            | 1            |
| 966 01    | GEN SET: DED SKD M        | MEP 802A   |                       | 2        |     | 50          | 32         | 36          | 825          | 22          | 1          | 2            |
| 3404 02   | RADIO SET HIGH FRE        |            | RADIO                 | 2        |     | 27          | 20         | 40          | 130          | 8           |            | 1            |
| J35813 01 | GEN SET DED 5KW           | MEP 002A   |                       | 1        |     | 51          | 32         | 36          | 940          | 11          |            | 1            |
| 862 16    | HEATER DUCT TYPE P        | V867-GFC3  |                       | 1        |     | 56          | 33         | 55          | 450          | 13          |            | 1            |
| 601 01    | FIELD FEEDING KIT         | COMPANY LV |                       | 1        | R   | 254         | 91         | 93          | 5480         | 161         | 3          | 31           |
| L28351 03 | KITCHEN FIELD TLR         | MFK75A     |                       | 1        | R   | 178         | 93         | 94          | 4200         | 115         | 2          | 23           |
| 4154 02   | RANGE OUTFIT FIELD        | M59        |                       | 2        |     | 27          | 24         | 42          | 253          | 9           |            | 1            |
| 544 02    | RECOVERY VEH FTRAC        | M578       |                       | 1        | NR  | 254         | 124        | 115         | 49320        | 219         | 25         | 52           |
| 33399 04  | SANITATION CENTER         |            | DRAIN TABLE           | 1        |     | 49          | 27         | 38          | 41           | 9           |            | 1            |
| 33399 08  | SANITATION CENTER         |            | WORK TABLE            | 1        |     | 56          | 26         | 38          | 57           | 10          |            | 1            |
| 494 04    | TRK UTIL CRG/TRP C        | M998       |                       | 14       | R   | 181         | 84         | 53          | 5280         | 1478        | 37         | 163          |
| 2141 53   | TANK&PUMP UNIT LIQ        |            | TANK                  | 2        |     | 72          | 61         | 52          | 475          | 61          |            | 7            |
| V12141 54 | TANK&PUMP UNIT LIQ        |            | PUMP                  | 1        |     | 79          | 32         | 50          | 800          | 18          |            | 2            |
| 441 02    | TENT FRAME TYPE MA        |            | FRAME SECTIONS        | 1        |     | 133         | 29         | 26          | 605          | 27          |            | 1            |
| 441 03    | TENT FRAME TYPE MA        |            | FRAME SECTIONS        | 1        |     | 188         | 21         | 21          | 615          | 27          |            | 1            |
| V48441 04 | TENT FRAME TYPE MA        |            | FRAME SECTIONS        | 3        |     | 134         | 12         | 25          | 274          | 34          |            | 2            |
| V32593 02 | SHOP EQUIP AUTMV L        |            | MULTIPLE ITEMS        | 1        |     | 70          | 40         | 36          | 1002         | 19          | 1          | 1            |
| 5747 05   | TOOL KIT VEH FTRAC        |            | WELDER                | 1        |     | 64          | 37         | 37          | 1130         | 16          | 1          | 1            |
| 75400 13  | TRAILER CARGO 1/4         | M416A1     |                       | 2        | R   | 108         | 61         | 43          | 620          | 92          | 1          | 8            |
| V95811 02 | TRAILER CARGO 1-1/        | M105A2     |                       | 1        | R   | 166         | 83         | 55          | 2670         | 96          | 1          | 11           |
| 825 23    | TRAILER TANK WATER        | M149A2     |                       | 1        | R   | 162         | 81         | 81          | 2912         | 91          | 1          | 15           |
| D146 02   | TRUCK CARGO 2-1/2         | M35A2 WMM  |                       | 1        | R   | 279         | 96         | 81          | 13570        | 186         | 7          | 31           |
| X40831 20 | TRK CGO 5 TON LWB         | M924A1     |                       | 1        | R   | 311         | 97         | 94          | 22070        | 209         | 11         | 41           |
| 833 02    | TRUCK UTILITY 1/4         | M151A2     |                       | 2        | R   | 132         | 64         | 53          | 2450         | 117         | 2          | 13           |
| 5068 01   | TRAILER CARGO 2 1/        | LMTV       |                       | 1        | R   | 209         | 96         | 58          | 2491         | 139         | 1          | 17           |
| Z40430 02 | TRUCK CARGO 2 1/2         | 4X4 LMTV W |                       | 3        | R   | 254         | 96         | 102         | 24013        | 508         | 36         | 108          |
| Z2222X 99 | Total Accompanying Supply | --         |                       |          |     |             |            |             | 18645        | 117         | 9          | 23           |
| Z22Y 99   | Total Ammunition          | -----      |                       |          |     |             |            |             | 1080         | 3           | 1          | 1            |
| Z2222Z 99 | Total Aggregate TOE *     | ---        |                       |          |     |             |            |             | 37311        | 272         | 19         | 54           |
|           |                           |            |                       |          |     |             |            |             |              | 4560        | 186        | 689          |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

BASE CASE

(LIGHT)

Date - 18-OCT-93

## UNIT EQUIPMENT LIST

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INF BN (LIGHT)

SRC - 07015L000

Authorized Personnel Strength - 551

3 Multiples of Unit in Force

|        | NDX | Nomenclature                 | Model      | Component<br>Description | Auth<br>Qty | Veh | Length<br>(IN) | Width<br>(IN) | Height<br>(IN) | Weight<br>(LBS) | Square<br>Feet | Short<br>Tons | Measure<br>Tons |
|--------|-----|------------------------------|------------|--------------------------|-------------|-----|----------------|---------------|----------------|-----------------|----------------|---------------|-----------------|
| A79381 | 01  | ANTENNA GROUP                | OE-254(1)G |                          | 15          |     | 43             | 40            | 40             | 48              | 179            |               | 15              |
| 68966  | 01  | DRUM FABRIC FUEL             | 500 GAL CA |                          | 2           |     | 74             | 35            | 18             | 233             | 36             |               | 1               |
| 6742   | 02  | REEL EQUIPMENT               |            | STAND                    | 25          |     | 6              | 24            | 36             | 32              | 25             |               | 2               |
| 100474 | 01  | SHELTER SYS TLR MT N51       |            |                          | 2           | R   | 168            | 85            | 96             | 5360            | 198            | 5             | 40              |
| T05096 | 01  | TRK UTIL TOW CAR 1 M966      |            |                          | 4           | R   | 180            | 85            | 74             | 7195            | 425            | 14            | 66              |
| 8844   | 01  | TRK AMB 4 LITTER 4 M997      |            |                          | 4           | R   | 204            | 86            | 101            | 7500            | 487            | 15            | 103             |
| 1494   | 04  | TRK UTIL CRG/TRP C M998      |            |                          | 23          | R   | 181            | 84            | 53             | 5280            | 2428           | 61            | 268             |
| T61562 | 04  | TRK UTIL CGO/TRP C M1038 W/W |            |                          | 4           | R   | 179            | 84            | 53             | 5200            | 418            | 10            | 46              |
| 5537   | 02  | TRAILER CARGO 3/4 M101A1     |            |                          | 3           | R   | 147            | 74            | 50             | 1350            | 227            | 2             | 24              |
| ZZZX   | 99  | Total Accompanying Supply    | --         |                          |             |     |                |               |                | 120862          | 756            | 60            | 151             |
| ZZZZZY | 99  | Total Ammunition             | -----      |                          |             |     |                |               |                | 6998            | 17             | 3             | 3               |
| ZZZZZZ | 99  | Total Aggregate TOE *        | ---        |                          |             |     |                |               |                | 60561           | 456            | 30            | 91              |
|        |     |                              |            |                          |             |     |                |               |                |                 |                | 5652          | 203             |
|        |     |                              |            |                          |             |     |                |               |                |                 |                |               | 810             |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

Date - 18-OCT-93

## UNIT EQUIPMENT LIST

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HMC INF DIV BDE (LID)

SRC - 77042L000

Authorized Personnel Strength - 131

1 Multiples of Unit in Force

| NOX       | Nomenclature              | Model      | Component Description | Auth Qty | Veh | Length (IN) | Width (IN) | Height (IN) | Weight (LBS) | Square Feet | Short Tons | Measure Tons |
|-----------|---------------------------|------------|-----------------------|----------|-----|-------------|------------|-------------|--------------|-------------|------------|--------------|
| A79381 01 | ANTENNA GROUP             | OE-254(1)G |                       | 13       |     | 43          | 40         | 40          | 48           | 155         |            | 13           |
| 32887 02  | CLEANER STM WML MT        | NONE       |                       | 1        | R   | 100         | 72         | 89          | 2780         | 50          | 1          | 9            |
| 5553 01   | DISTR/ILLUM SET EL        | 1PH/60AMP  |                       | 4        |     | 60          | 36         | 36          | 400          | 60          | 1          | 5            |
| 611966 01 | GEN SET: DED SKD M        | MEP 802A   |                       | 4        |     | 50          | 32         | 36          | 825          | 44          | 2          | 3            |
| H35404 02 | RADIO SET HIGH FRE        |            | RADIO                 | 2        |     | 27          | 20         | 40          | 130          | 8           |            | 1            |
| 4862 16   | HEATER DUCT TYPE P        | VB67-GFC3  |                       | 1        |     | 56          | 33         | 55          | 450          | 13          |            | 1            |
| 8601 01   | FIELD FEEDING KIT         | COMPANY LV |                       | 14       | R   | 254         | 91         | 93          | 5480         | 2247        | 38         | 435          |
| L28351 03 | KITCHEN FIELD TLR         | MFK75A     |                       | 7        | R   | 178         | 93         | 94          | 4200         | 805         | 15         | 158          |
| 4154 02   | RANGE OUTFIT FIELD        | M59        |                       | 14       |     | 27          | 24         | 42          | 253          | 63          | 2          | 6            |
| 3399 04   | SANITATION CENTER         |            | DRAIN TABLE           | 7        |     | 49          | 27         | 38          | 41           | 64          |            | 5            |
| S33399 08 | SANITATION CENTER         |            | WORK TABLE            | 7        |     | 56          | 26         | 38          | 57           | 71          |            | 6            |
| T07679 01 | TRK UTIL, NVY HMMWV       | M1097      |                       | 6        | R   | 191         | 86         | 72          | 5600         | 684         | 17         | 103          |
| 1494 04   | TRK UTIL CRG/TRP C        | M998       |                       | 22       | R   | 181         | 84         | 53          | 5280         | 2323        | 58         | 256          |
| V49950 01 | TANK UNIT LIQ DSPN        | TK LIQ DIS |                       | 1        |     | 73          | 61         | 56          | 410          | 31          |            | 4            |
| V48441 02 | TENT FRAME TYPE MA        |            | FRAME SECTIONS        | 1        |     | 133         | 29         | 26          | 605          | 27          |            | 1            |
| 8441 03   | TENT FRAME TYPE MA        |            | FRAME SECTIONS        | 1        |     | 188         | 21         | 21          | 615          | 27          |            | 1            |
| 8441 04   | TENT FRAME TYPE MA        |            | FRAME SECTIONS        | 3        |     | 134         | 12         | 25          | 274          | 34          |            | 2            |
| M32730 01 | SHOP EQUIP AUTMV L        | S/E AUTO C |                       | 1        |     | 167         | 87         | 84          | 4460         | 101         | 2          | 18           |
| M5537 02  | TRAILER CARGO 3/4         | M101A1     |                       | 4        | R   | 147         | 74         | 50          | 1350         | 302         | 3          | 31           |
| 5811 02   | TRAILER CARGO 1-1/        | M105A2     |                       | 2        | R   | 166         | 83         | 55          | 2670         | 191         | 3          | 22           |
| 098825 23 | TRAILER TANK WATER        | M149A2     |                       | 7        | R   | 162         | 81         | 81          | 2912         | 638         | 10         | 108          |
| 740439 02 | TRUCK CARGO 5 TON         | MTV W/E    |                       | 10       | R   | 275         | 96         | 102         | 32207        | 1833        | 161        | 390          |
| 0712 01   | TLR CGO MTV W/DPS         | NONE       |                       | 1        | R   | 220         | 96         | 58          | 4733         | 147         | 2          | 18           |
| 2222X 99  | Total Accompanying Supply | --         |                       |          |     |             |            |             | 28735        | 180         | 14         | 36           |
| 2222Z 99  | Total Ammunition          | -----      |                       |          |     |             |            |             | 1664         | 4           | 1          | 1            |
| 2222 99   | Total Aggregate TOE *     | ---        |                       |          |     |             |            |             | 53533        | 424         | 27         | 85           |
|           |                           |            |                       |          |     |             |            |             |              | 10526       | 359        | 1716         |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

ALTERNATIVE 1

(HEAVY)

Date - 18-OCT-93

## UNIT EQUIPMENT LIST

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INF BN (MECH)

SRC - 07245L000

Authorized Personnel Strength - 826

2 Multiples of Unit in Force

| MDX       | Nomenclature        | Model      | Component Description | Auth Qty | Veh | Length (IN) | Width (IN) | Height (IN) | Weight (LBS) | Square Feet | Short Tons | Measure Tons |
|-----------|---------------------|------------|-----------------------|----------|-----|-------------|------------|-------------|--------------|-------------|------------|--------------|
| A79381 01 | ANTENNA GROUP       | OE-254(1)G |                       | 32       |     | 43          | 40         | 40          | 48           | 382         | 1          | 32           |
| 0990 02   | CARRIER: MORTAR SY  | M1064      |                       | 6        | NR  | 210         | 106        | 80          | 27635        | 927         | 83         | 155          |
| 3234 02   | CARRIER PERSONNEL   | M113A3     |                       | 17       | NR  | 208         | 100        | 81          | 23880        | 2456        | 203        | 414          |
| C32887 02 | CLEANER STM WNL MT  | NONE       |                       | 1        | R   | 100         | 72         | 89          | 2780         | 50          | 1          | 9            |
| 011538 02 | CARRIER COMD P FTR  | M577A1     |                       | 5        | NR  | 192         | 100        | 104         | 22415        | 667         | 56         | 144          |
| 5896 04   | COMBAT VEN IMP TOW  | M901A1     |                       | 12       | NR  | 189         | 100        | 102         | 30000        | 1575        | 180        | 335          |
| 09242 03  | COMP RCP AIR PWR D  | C-20X-80/6 |                       | 1        |     | 65          | 25         | 40          | 610          | 11          |            | 1            |
| F40375 01 | FIGHTING VEHICLE H  | M2A2       |                       | 58       | NR  | 258         | 140        | 120         | 65692        | 14548       | 1905       | 3637         |
| 0462 01   | FIGHTING VEHICLE F  | M3A1       |                       | 2        | NR  | 258         | 126        | 117         | 48896        | 452         | 49         | 110          |
| 0530 01   | FIGHTING VEHICLE H  | M3A2       |                       | 4        | NR  | 258         | 140        | 120         | 66027        | 1003        | 132        | 251          |
| G11966 01 | GEN SET: DED SKD H  | MEP 802A   |                       | 1        |     | 50          | 32         | 36          | 825          | 11          |            | 1            |
| 05813 01  | GEN SET DED SKW     | MEP 002A   |                       | 1        |     | 51          | 32         | 36          | 940          | 11          |            | 1            |
| 0462 16   | HEATER DUCT TYPE P  | VB67-GFC3  |                       | 1        |     | 56          | 33         | 55          | 450          | 13          |            | 1            |
| K28601 01 | FIELD FEEDING KIT   | COMPANY LV |                       | 5        | R   | 254         | 91         | 93          | 5480         | 803         | 14         | 155          |
| L28351 03 | KITCHEN FIELD TLR   | MFK75A     |                       | 4        | R   | 178         | 93         | 94          | 4200         | 460         | 8          | 90           |
| 0405 01   | BNS-120TOMEDLTORT   | K6A1       |                       | 6        | R   | 95          | 60         | 45          | 720          | 238         | 2          | 22           |
| 04154 02  | RANGE OUTFIT FIELD  | M59        |                       | 8        |     | 27          | 24         | 42          | 253          | 36          | 1          | 3            |
| M50681 04 | RECOVERY VEN FTRAC  | M88A1      |                       | 7        | NR  | 323         | 144        | 124         | 107840       | 2261        | 377        | 584          |
| 06742 02  | REEL EQUIPMENT      |            | STAND                 | 68       |     | 6           | 24         | 36          | 32           | 68          | 1          | 5            |
| 03399 04  | SANITATION CENTER   |            | DRAIN TABLE           | 4        |     | 49          | 27         | 38          | 41           | 37          |            | 3            |
| S33399 08 | SANITATION CENTER   |            | WORK TABLE            | 4        |     | 56          | 26         | 38          | 57           | 40          |            | 3            |
| T00161 01 | TEST STAND ENGINE   | NONE       |                       | 1        |     | 92          | 48         | 23          | 666          | 31          |            | 1            |
| 0474 01   | SHELTER SYS TLR MT  | M51        |                       | 2        | R   | 168         | 85         | 96          | 5360         | 198         | 5          | 40           |
| T59518 02 | TRUCK CARGO 10T 8X  | M977AM     |                       | 5        | R   | 401         | 96         | 101         | 38800        | 1337        | 97         | 281          |
| T59278 02 | TRUCK CARGO 10 T 8  | M977 WMM   |                       | 8        | R   | 401         | 96         | 101         | 38800        | 2139        | 155        | 450          |
| 01494 04  | TRK UTIL CRG/TRP C  | M998       |                       | 32       | R   | 181         | 84         | 53          | 5280         | 3379        | 84         | 373          |
| 03093 02  | TRUCK WRECKER 8X3   | M984 W/W   |                       | 1        | R   | 384         | 101        | 101         | 43180        | 269         | 22         | 57           |
| T87243 02 | TRK TANK 2500 GAL   | M978 WMM   |                       | 8        | R   | 401         | 96         | 101         | 38165        | 2139        | 153        | 450          |
| 0441 02   | TENT FRAME TYPE MA  |            | FRAME SECTIONS        | 1        |     | 133         | 29         | 26          | 605          | 27          |            | 1            |
| 0441 03   | TENT FRAME TYPE MA  |            | FRAME SECTIONS        | 1        |     | 188         | 21         | 21          | 615          | 27          |            | 1            |
| V48441 04 | TENT FRAME TYPE MA  |            | FRAME SECTIONS        | 3        |     | 134         | 12         | 25          | 274          | 34          |            | 2            |
| M52593 02 | SHOP EQUIP AUTMV L  |            | MULTIPLE ITEMS        | 5        |     | 70          | 40         | 36          | 1002         | 97          | 3          | 7            |
| 02730 01  | SHOP EQUIP AUTMV L  | S/E AUTO C |                       | 1        |     | 167         | 87         | 84          | 4460         | 101         | 2          | 18           |
| M5391 04  | WLD SHOP TLR MTD    | NONE       |                       | 1        | R   | 179         | 96         | 97          | 7355         | 119         | 4          | 2            |
| M65747 05 | TOOL KIT VEN FTRAC  |            | WELDER                | 1        |     | 64          | 37         | 37          | 1130         | 16          | 1          | 1            |
| 0825 23   | TRAILER TANK WATER  | M149A2     |                       | 10       | R   | 162         | 81         | 81          | 2912         | 911         | 15         | 154          |
| 00009 02  | TRUCK CARGO 2 1/2   | M35A2      |                       | 2        | R   | 265         | 96         | 81          | 13180        | 353         | 13         | 60           |
| X40146 02 | TRUCK CARGO 2-1/2   | M35A2 WMM  |                       | 6        | R   | 279         | 96         | 81          | 13570        | 1116        | 41         | 188          |
| 00794 15  | TRK CGO D/S 5 TON   | M923A1     |                       | 4        | R   | 311         | 97         | 94          | 22175        | 838         | 44         | 164          |
| 06157 01  | ARMED MAINTENANCE V | NONE       |                       | 6        | NR  | 283         | 117        | 116         | 56000        | 1380        | 168        | 333          |
| Z36068 01 | TRAILER CARGO 2 1/  | LMTV       |                       | 34       | R   | 209         | 96         | 58          | 2491         | 4737        | 42         | 572          |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

Date - 18-OCT-93

## UNIT EQUIPMENT LIST

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INF BN (MECH)

SRC - 07245L000

Authorized Personnel Strength - 826

2 Multiples of Unit in Force

| MDX       | Nomenclature              | Model      | Component Description | Auth Qty | Veh | Length (IN) | Width (IN) | Height (IN) | Weight (LBS) | Square Feet | Short Tons | Measure Tons |
|-----------|---------------------------|------------|-----------------------|----------|-----|-------------|------------|-------------|--------------|-------------|------------|--------------|
| 240337 08 | TRUCK CARGO 5 TON         | MTV LMB W/ |                       | 4        | R   | 352         | 96         | 102         | 33613        | 939         | 67         | 199          |
| 0430 02   | TRUCK CARGO 2 1/2         | 4X4 LMTV W |                       | 32       | R   | 254         | 96         | 102         | 24013        | 5419        | 384        | 1151         |
| 0712 01   | TRLR CGO MTV W/DPS        | NONE       |                       | 21       | R   | 220         | 96         | 58          | 4733         | 3080        | 50         | 372          |
| 293558 08 | TRUCK CARGO MTV LV        | W/MNE W/E  |                       | 10       | R   | 386         | 96         | 102         | 37314        | 2573        | 187        | 547          |
| 204047 02 | TRUCK TANK                | POL MTV W/ |                       | 7        | R   | 314         | 96         | 102         | 26130        | 1465        | 91         | 311          |
| 4433 02   | TRUCK WRECKER             | MTV W/V W/ |                       | 1        | R   | 352         | 96         | 102         | 34826        | 235         | 17         | 50           |
| 2222X 99  | Total Accompanying Supply | --         |                       |          |     |             |            |             | 177674       | 1111        | 89         | 222          |
| 2222Y 99  | Total Ammunition          | -----      |                       |          |     |             |            |             | 10287        | 25          | 5          | 5            |
| 2222 99   | Total Aggregate TOE *     | ---        |                       |          |     |             |            |             | 233308       | 1736        | 117        | 347          |
|           |                           |            |                       |          |     |             |            |             |              | 61880       | 4872       | 12342        |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

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## UNIT EQUIPMENT LIST

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alt one nles heavy

SRC - 07348T200

Authorized Personnel Strength - 57

1 Multiples of Unit in Force

| NDX       | Nomenclature          | Model      | Component Description | Auth Qty | Veh | Length (IN) | Width (IN) | Height (IN) | Weight (LBS) | Square Feet | Short Tons | Measure Tons |
|-----------|-----------------------|------------|-----------------------|----------|-----|-------------|------------|-------------|--------------|-------------|------------|--------------|
| A79381 01 | ANTENNA GROUP         | OE-254(1)G |                       | 5        |     | 43          | 40         | 40          | 48           | 60          |            | 5            |
| 1742 02   | REEL EQUIPMENT        |            | STAND                 | 15       |     | 6           | 24         | 36          | 32           | 15          |            | 1            |
| 7679 01   | TRK UTIL, Hvy H98WV   | M1097      |                       | 12       | R   | 191         | 86         | 72          | 5600         | 1369        | 34         | 205          |
| T39518 02 | TRUCK CARGO 10T 8X    | M977WJN    |                       | 3        | R   | 401         | 96         | 101         | 38800        | 802         | 58         | 169          |
| T61494 04 | TRK UTIL CRG/TRP C    | M998       |                       | 5        | R   | 181         | 84         | 53          | 5280         | 528         | 13         | 58           |
| 3093 02   | TRUCK WRECKER 8X8     | M984 W/V   |                       | 1        | R   | 384         | 101        | 101         | 43180        | 269         | 22         | 57           |
| 107243 02 | TRK TANK 2500 GAL     | M978 WJN   |                       | 1        | R   | 401         | 96         | 101         | 38165        | 267         | 19         | 56           |
| T92242 01 | TRK UTILITY 1-1/4     | M1025      |                       | 12       | R   | 180         | 85         | 74          | 6104         | 1275        | 37         | 197          |
| 3825 23   | TRAILER TANK WATER    | M149A2     |                       | 1        | R   | 162         | 81         | 81          | 2912         | 91          | 1          | 15           |
| 1430 02   | TRUCK CARGO 2 1/2     | 4X4 LMTV W |                       | 1        | R   | 254         | 96         | 102         | 24013        | 169         | 12         | 36           |
| ZZZZZZ 99 | Total Aggregate TOE * | ---        |                       |          |     |             |            |             | 13808        | 115         | 7          | 23           |
|           |                       |            |                       |          |     |             |            |             |              | 4960        | 203        | 822          |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

Date - 18-OCT-93

## UNIT EQUIPMENT LIST

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TANK BATTALION (NAVY DIV)

SRC - 17375L000

Authorized Personnel Strength - 587

2 Multiples of Unit in Force

| Item   | NDX | Nomenclature       | Model      | Component Description | Auth Qty | Length (IN) | Width (IN) | Height (IN) | Weight (LBS) | Square Feet | Short Tons | Measure Tons |
|--------|-----|--------------------|------------|-----------------------|----------|-------------|------------|-------------|--------------|-------------|------------|--------------|
| A79381 | 01  | ANTENNA GROUP      | OE-254(1)G |                       | 21       | 43          | 40         | 40          | 48           | 251         | 1          | 21           |
| 0990   | 02  | CARRIER: MORTAR SY | N1064      |                       | 6        | NR          | 210        | 106         | 80           | 27635       | 83         | 155          |
| 8234   | 02  | CARRIER PERSONNEL  | N113A3     |                       | 13       | NR          | 208        | 100         | 81           | 23880       | 155        | 317          |
| C32887 | 02  | CLEANER STM WML MT | NONE       |                       | 1        | R           | 100        | 72          | 89           | 2780        | 1          | 9            |
| A11538 | 02  | CARRIER COND P FTR | N577A1     |                       | 5        | NR          | 192        | 100         | 104          | 22415       | 56         | 144          |
| 9242   | 03  | COMP RCP AIR PWR D | C-20X-80/6 |                       | 1        |             | 65         | 25          | 40           | 610         | 11         | 1            |
| 55485  | 01  | FEEDER SYS ELECT   | 3PH 40AMP  |                       | 2        |             | 60         | 36          | 36           | 400         | 30         | 2            |
| F55621 | 01  | FEEDER SYS ELECT   | 3PH 100AMP |                       | 1        |             | 84         | 48          | 48           | 700         | 28         | 3            |
| 0530   | 01  | FIGHTING VEHICLE M | M3A2       |                       | 6        | NR          | 258        | 140         | 120          | 66027       | 198        | 376          |
| 5813   | 01  | GEN SET DED SKW    | MEP 002A   |                       | 2        |             | 51         | 32          | 36           | 940         | 1          | 2            |
| K24862 | 16  | HEATER DUCT TYPE P | VB67-GFC3  |                       | 1        |             | 56         | 33          | 55           | 450         | 13         | 1            |
| 0601   | 01  | FIELD FEEDING KIT  | COMPANY LV |                       | 4        | R           | 254        | 91          | 93           | 5480        | 11         | 124          |
| 8351   | 03  | KITCHEN FIELD TLR  | NFK75A     |                       | 3        | R           | 178        | 93          | 94           | 4200        | 6          | 68           |
| 8405   | 01  | BMS-120TOWEDLTWORT | K6A1       |                       | 6        | R           | 95         | 60          | 45           | 720         | 2          | 22           |
| R14154 | 02  | RANGE OUTFIT FIELD | N59        |                       | 6        |             | 27         | 24          | 42           | 253         | 1          | 2            |
| 0681   | 04  | RECOVERY VEN FTRAC | N88A1      |                       | 7        | NR          | 323        | 144         | 124          | 107840      | 377        | 584          |
| 6742   | 02  | REEL EQUIPMENT     |            | STAND                 | 38       |             | 6          | 24          | 36           | 32          | 1          | 3            |
| 833399 | 04  | SANITATION CENTER  |            | DRAIN TABLE           | 3        |             | 49         | 27          | 38           | 41          | 28         | 2            |
| 3399   | 08  | SANITATION CENTER  |            | WORK TABLE            | 3        |             | 56         | 26          | 38           | 57          | 30         | 2            |
| 0161   | 01  | TEST STAND ENGINE  | NONE       |                       | 1        |             | 92         | 48          | 23           | 666         | 31         | 1            |
| T00474 | 01  | SHELTER SYS TLR MT | N51        |                       | 2        | R           | 168        | 85          | 96           | 5360        | 5          | 40           |
| 79518  | 02  | TRUCK CARGO 10T BX | N977WAM    |                       | 5        | R           | 401        | 96          | 101          | 38800       | 97         | 281          |
| 9278   | 02  | TRUCK CARGO 10 T 8 | N977 WOWN  |                       | 10       | R           | 401        | 96          | 101          | 38800       | 194        | 563          |
| T61494 | 04  | TRK UTIL CRG/TRP C | N998       |                       | 30       | R           | 181        | 84          | 53           | 5280        | 79         | 350          |
| T63093 | 02  | TRUCK WRECKER 8X8  | N984 W/W   |                       | 1        | R           | 384        | 101         | 101          | 43180       | 269        | 57           |
| 7243   | 02  | TRK TANK 2500 GAL  | N978 WOWN  |                       | 23       | R           | 401        | 96          | 101          | 38165       | 6149       | 1294         |
| 6883   | 02  | TRAILER FLATBED 5  | N1061A1    |                       | 1        | R           | 223        | 98          | 40           | 5850        | 3          | 13           |
| V12141 | 53  | TANK&PUMP UNIT LIQ |            | TANK                  | 2        |             | 72         | 61          | 52           | 475         | 61         | 7            |
| 2141   | 54  | TANK&PUMP UNIT LIQ |            | PUMP                  | 1        |             | 79         | 32          | 50           | 800         | 18         | 2            |
| 9950   | 01  | TANK UNIT LIQ DSPN | TK LIQ DIS |                       | 1        |             | 73         | 61          | 56           | 410         | 31         | 4            |
| V48441 | 02  | TENT FRAME TYPE MA |            | FRAME SECTIONS        | 1        |             | 133        | 29          | 26           | 605         | 27         | 1            |
| 48441  | 03  | TENT FRAME TYPE MA |            | FRAME SECTIONS        | 1        |             | 188        | 21          | 21           | 615         | 27         | 1            |
| 8441   | 04  | TENT FRAME TYPE MA |            | FRAME SECTIONS        | 3        |             | 134        | 12          | 25           | 274         | 34         | 2            |
| 52730  | 01  | SHOP EQUIP AUTHV L | S/E AUTO C |                       | 1        |             | 167        | 87          | 84           | 4460        | 101        | 18           |
| 48391  | 04  | WLD SHOP TLR MTD   | NONE       |                       | 1        | R           | 179        | 96          | 97           | 7355        | 119        | 24           |
| 5747   | 05  | TOOL KIT VEN FTRAC |            | WELDER                | 1        |             | 64         | 37          | 37           | 1130        | 16         | 1            |
| 5811   | 02  | TRAILER CARGO 1-1/ | N105A2     |                       | 19       | R           | 166        | 83          | 55           | 2670        | 25         | 208          |
| W98825 | 23  | TRAILER TANK WATER | N149A2     |                       | 8        | R           | 162        | 81          | 81           | 2912        | 12         | 123          |
| 0009   | 02  | TRUCK CARGO 2 1/2  | N35A2      |                       | 22       | R           | 265        | 96          | 81           | 13180       | 145        | 656          |
| 0146   | 02  | TRUCK CARGO 2-1/2  | N35A2 WAM  |                       | 5        | R           | 279        | 96          | 81           | 13570       | 34         | 157          |
| X40794 | 15  | TRK CGO D/S 5 TON  | N923A1     |                       | 5        | R           | 311        | 97          | 94           | 22175       | 55         | 205          |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

Date - 18-OCT-93

UNIT EQUIPMENT LIST

TANK BATTALION (HVV DIV)  
SRC - 17375L000  
Authorized Personnel Strength - 587  
2 Multiples of Unit in Force

| NDX       | Nomenclature              | Model      | Component   | Auth | Length | Width | Height | Weight | Square | Short | Measure |      |
|-----------|---------------------------|------------|-------------|------|--------|-------|--------|--------|--------|-------|---------|------|
|           |                           |            | Description | Qty  | Veh    | (IN)  | (IN)   | (IN)   | (LBS)  | Feet  | Tons    | Tons |
| 206157 01 | ARMED MAINTENANCE V       | NONE       |             | 4    | NR     | 283   | 117    | 116    | 56000  | 920   | 112     | 222  |
| 0430 02   | TRUCK CARGO 2 1/2 4X4     | LMTV W     |             | 4    | R      | 254   | 96     | 102    | 24013  | 677   | 48      | 144  |
| 7258 04   | TANK COMBAT FULL T        | M1A1E2     |             | 58   | NR     | 360   | 144    | 114    | 123780 | 20880 | 3590    | 4959 |
| 294433 02 | TRUCK WRECKER             | MTV W/W W/ |             | 1    | R      | 352   | 96     | 102    | 34826  | 235   | 17      | 50   |
| 72222X 99 | Total Accompanying Supply | --         |             |      |        |       |        |        | 128758 | 805   | 64      | 161  |
| 7222Y 99  | Total Ammunition          | -----      |             |      |        |       |        |        | 7455   | 18    | 4       | 4    |
| 72222Z 99 | Total Aggregate TOE *     | ---        |             |      |        |       |        |        | 188749 | 1276  | 94      | 255  |
|           |                           |            |             |      |        |       |        |        | 56623  | 5944  | 11641   |      |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

Date - 18-OCT-93

## UNIT EQUIPMENT LIST

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MNC INF DIV (MECH) BDE

SRC - 87042L200

Authorized Personnel Strength - 85

1 Multiples of Unit in Force

| N      | NOX | Nomenclature              | Model      | Component Description | Auth Qty | Length (IN) | Width (IN) | Height (IN) | Weight (LBS) | Square Feet | Short Tons | Measure Tons |
|--------|-----|---------------------------|------------|-----------------------|----------|-------------|------------|-------------|--------------|-------------|------------|--------------|
| A79381 | 01  | ANTENNA GROUP             | OE-254(1)G |                       | 11       | 43          | 40         | 40          | 48           | 131         |            | 11           |
| A18234 | 02  | CARRIER PERSONNEL         | M113A3     |                       | 1        | NR          | 208        | 100         | 81           | 23880       | 12         | 24           |
| 2887   | 02  | CLEANER STM WML MT        | NONE       |                       | 1        | R           | 100        | 72          | 89           | 2780        | 1          | 9            |
| U11538 | 02  | CARRIER COMD P FTR        | M577A1     |                       | 1        | NR          | 192        | 100         | 104          | 22415       | 11         | 29           |
| F55553 | 01  | DISTR/ILLUM SET EL        | 1PH/60AMP  |                       | 1        |             | 60         | 36          | 36           | 400         |            | 1            |
| 1966   | 01  | GEN SET: DED SKD M        | MEP 802A   |                       | 2        |             | 50         | 32          | 36           | 825         | 1          | 2            |
| 5404   | 02  | RADIO SET HIGH PRE        |            | RADIO                 | 2        |             | 27         | 20          | 40           | 130         |            | 1            |
| J35813 | 01  | GEN SET DED SKW           | MEP 002A   |                       | 1        |             | 51         | 32          | 36           | 940         |            | 1            |
| 4862   | 16  | HEATER DUCT TYPE P        | VB67-GFC3  |                       | 1        |             | 56         | 33          | 55           | 450         |            | 1            |
| 8601   | 01  | FIELD FEEDING KIT         | COMPANY LV |                       | 1        | R           | 254        | 91          | 93           | 5480        | 3          | 31           |
| L28351 | 03  | KITCHEN FIELD TLR         | MPK75A     |                       | 1        | R           | 178        | 93          | 94           | 4200        | 2          | 23           |
| R14154 | 02  | RANGE OUTFIT FIELD        | M59        |                       | 2        |             | 27         | 24          | 42           | 253         |            | 1            |
| 0544   | 02  | RECOVERY VEN FTRAC        | M578       |                       | 1        | NR          | 254        | 124         | 115          | 49320       | 25         | 52           |
| 33399  | 04  | SANITATION CENTER         |            | DRAIN TABLE           | 1        |             | 49         | 27          | 38           | 41          |            | 1            |
| 33399  | 08  | SANITATION CENTER         |            | WORK TABLE            | 1        |             | 56         | 26          | 38           | 57          |            | 1            |
| 1494   | 04  | TRK UTIL CRG/TRP C        | M998       |                       | 14       | R           | 181        | 84          | 53           | 5280        | 37         | 163          |
| 2141   | 53  | TANK&PUMP UNIT LIQ        |            | TANK                  | 2        |             | 72         | 61          | 52           | 475         |            | 7            |
| V12141 | 54  | TANK&PUMP UNIT LIQ        |            | PUMP                  | 1        |             | 79         | 32          | 50           | 800         |            | 2            |
| 8441   | 02  | TENT FRAME TYPE MA        |            | FRAME SECTIONS        | 1        |             | 133        | 29          | 26           | 605         |            | 1            |
| 8441   | 03  | TENT FRAME TYPE MA        |            | FRAME SECTIONS        | 1        |             | 188        | 21          | 21           | 615         |            | 1            |
| 8441   | 04  | TENT FRAME TYPE MA        |            | FRAME SECTIONS        | 3        |             | 134        | 12          | 25           | 274         |            | 2            |
| 32593  | 02  | SHOP EQUIP AUTMV L        |            | MULTIPLE ITEMS        | 1        |             | 70         | 40          | 36           | 1002        | 1          | 1            |
| 5747   | 05  | TOOL KIT VEN FTRAC        |            | WELDER                | 1        |             | 64         | 37          | 37           | 1130        | 1          | 1            |
| 95400  | 13  | TRAILER CARGO 1/4         | M416A1     |                       | 2        | R           | 108        | 61          | 43           | 620         | 1          | 8            |
| 95811  | 02  | TRAILER CARGO 1-1/        | M105A2     |                       | 1        | R           | 166        | 83          | 55           | 2670        | 1          | 11           |
| 8825   | 23  | TRAILER TANK WATER        | M149A2     |                       | 1        | R           | 162        | 81          | 81           | 2912        | 1          | 15           |
| 0146   | 02  | TRUCK CARGO 2-1/2         | M35A2 WAM  |                       | 1        | R           | 279        | 96          | 81           | 13570       | 7          | 31           |
| X40831 | 20  | TRK CGO 5 TON LMB         | M924A1     |                       | 1        | R           | 311        | 97          | 94           | 22070       | 11         | 41           |
| 0633   | 02  | TRUCK UTILITY 1/4         | M151A2     |                       | 2        | R           | 132        | 64          | 53           | 2450        | 2          | 13           |
| 6068   | 01  | TRAILER CARGO 2 1/        | LMTV       |                       | 1        | R           | 209        | 96          | 58           | 2491        | 1          | 17           |
| 240430 | 02  | TRUCK CARGO 2 1/2         | 4X4 LMTV W |                       | 3        | R           | 254        | 96          | 102          | 24013       | 36         | 108          |
| 72222X | 99  | Total Accompanying Supply | --         |                       |          |             |            |             |              | 18645       | 9          | 23           |
| 7222Y  | 99  | Total Ammunition          | -----      |                       |          |             |            |             |              | 1080        | 1          | 1            |
| 7222Z  | 99  | Total Aggregate TOE *     | ---        |                       |          |             |            |             |              | 37311       | 19         | 54           |
|        |     |                           |            |                       |          |             |            |             |              | 4560        | 186        | 689          |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

ALTERNATIVE 1

(LIGHT)

INF BN (LIGHT)

SRC - 07015L000

Authorized Personnel Strength - 551

3 Multiples of Unit in Force

| M    | NDX | Nomenclature                 | Model      | Component<br>Description | Auth<br>Qty | Veh | Length<br>(IN) | Width<br>(IN) | Height<br>(IN) | Weight<br>(LBS) | Square<br>Feet | Short<br>Tons | Measure<br>Tons |
|------|-----|------------------------------|------------|--------------------------|-------------|-----|----------------|---------------|----------------|-----------------|----------------|---------------|-----------------|
| 9381 | 01  | ANTENNA GROUP                | OE-254(1)G |                          | 15          |     | 43             | 40            | 40             | 48              | 179            |               | 15              |
| 8966 | 01  | DRUM FABRIC FUEL             | 500 GAL CA |                          | 2           |     | 74             | 35            | 18             | 233             | 36             |               | 1               |
| 6742 | 02  | REEL EQUIPMENT               |            | STAND                    | 25          |     | 6              | 24            | 36             | 32              | 25             |               | 2               |
| 0474 | 01  | SHELTER SYS TLR MT M51       |            |                          | 2           | R   | 168            | 85            | 96             | 5360            | 198            | 5             | 40              |
| 5096 | 01  | TRK UTIL TOM CAR 1 M966      |            |                          | 4           | R   | 180            | 85            | 74             | 7195            | 425            | 14            | 66              |
| 8844 | 01  | TRK AMB 4 LITTER 4 M997      |            |                          | 4           | R   | 204            | 86            | 101            | 7500            | 487            | 15            | 103             |
| 1494 | 04  | TRK UTIL CRG/TRP C M998      |            |                          | 23          | R   | 181            | 84            | 53             | 5280            | 2428           | 61            | 268             |
| 1562 | 04  | TRK UTIL CGO/TRP C M1038 W/W |            |                          | 4           | R   | 179            | 84            | 53             | 5200            | 418            | 10            | 46              |
| 5537 | 02  | TRAILER CARGO 3/4 M101A1     |            |                          | 3           | R   | 147            | 74            | 50             | 1350            | 227            | 2             | 24              |
| ZZZX | 99  | Total Accompanying Supply    | --         |                          |             |     |                |               |                | 120862          | 756            | 60            | 151             |
| ZZZY | 99  | Total Ammunition             | -----      |                          |             |     |                |               |                | 6998            | 17             | 3             | 3               |
| ZZZZ | 99  | Total Aggregate TOE *        | ---        |                          |             |     |                |               |                | 60561           | 456            | 30            | 91              |
|      |     |                              |            |                          |             |     |                |               |                |                 | 5652           | 203           | 810             |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

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UNIT EQUIPMENT LIST

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MLOS CA COMPANY (L10)

SRC - 073487200

Authorized Personnel Strength - 57

1 Multiples of Unit in Force

| NDX    | Nomenclature          | Model      | Component<br>Description | Auth<br>Qty | Veh | Length<br>(IN) | Width<br>(IN) | Height<br>(IN) | Weight<br>(LBS) | Square<br>Feet | Short<br>Tons | Measure<br>Tons |
|--------|-----------------------|------------|--------------------------|-------------|-----|----------------|---------------|----------------|-----------------|----------------|---------------|-----------------|
| 181 01 | ANTENNA GROUP         | OE-254(1)G |                          | 5           |     | 43             | 40            | 40             | 48              | 60             |               | 5               |
| 142 02 | REEL EQUIPMENT        |            | STAND                    | 15          |     | 6              | 24            | 36             | 32              | 15             |               | 1               |
| 179 01 | TRK UTIL, Hvy W99WV   | M1097      |                          | 12          | R   | 191            | 86            | 72             | 5600            | 1369           | 34            | 205             |
| 118 02 | TRUCK CARGO 10T 8X    | M977WAM    |                          | 3           | R   | 401            | 96            | 101            | 38800           | 802            | 58            | 169             |
| 194 04 | TRK UTIL CRG/TRP C    | M998       |                          | 5           | R   | 181            | 84            | 53             | 5280            | 528            | 13            | 58              |
| 193 02 | TRUCK WRECKER 8X8     | M984 W/W   |                          | 1           | R   | 384            | 101           | 101            | 43180           | 269            | 22            | 57              |
| 143 02 | TRK TANK 2500 GAL     | M978 WDM   |                          | 1           | R   | 401            | 96            | 101            | 38165           | 267            | 19            | 56              |
| 142 01 | TRK UTILITY 1-1/4     | M1025      |                          | 12          | R   | 180            | 85            | 74             | 6104            | 1275           | 37            | 197             |
| 125 23 | TRAILER TANK WATER    | M149A2     |                          | 1           | R   | 162            | 81            | 81             | 2912            | 91             | 1             | 15              |
| 130 02 | TRUCK CARGO 2 1/2     | 4X4 LMTV W |                          | 1           | R   | 254            | 96            | 102            | 24013           | 169            | 12            | 36              |
| 122 99 | Total Aggregate TOE * | ---        |                          |             |     |                |               |                | 11840           | 88             | 6             | 18              |
|        |                       |            |                          |             |     |                |               |                |                 | 4934           | 202           | 817             |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high  
 and is assumed to be stacked to a height of 96 inches

Date - 18-OCT-93

## UNIT EQUIPMENT LIST

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MHC INF DIV BDE (LID)

SRC - 77042L000

Authorized Personnel Strength - 131

1 Multiples of Unit in Force

| NDX       | Nomenclature                  | Model      | Component Description | Auth Qty | Veh | Length (IN) | Width (IN) | Height (IN) | Weight (LBS) | Square Feet | Short Tons | Measure Tons |
|-----------|-------------------------------|------------|-----------------------|----------|-----|-------------|------------|-------------|--------------|-------------|------------|--------------|
| A79381 01 | ANTENNA GROUP                 | OE-254(1)G |                       | 13       |     | 43          | 40         | 40          | 48           | 155         |            | 13           |
| 2887 02   | CLEANER STM WNL MT NONE       |            |                       | 1        | R   | 100         | 72         | 89          | 2780         | 50          | 1          | 9            |
| 5553 01   | DISTR/ILLUM SET EL 1PH/60AMP  |            |                       | 4        |     | 60          | 36         | 36          | 400          | 60          | 1          | 5            |
| G11966 01 | GEN SET: DED SKD M MEP 802A   |            |                       | 4        |     | 50          | 32         | 36          | 825          | 44          | 2          | 3            |
| M33404 02 | RADIO SET HIGH FRE            |            | RADIO                 | 2        |     | 27          | 20         | 40          | 130          | 8           |            | 1            |
| 862 16    | HEATER DUCT TYPE P VB67-GFC3  |            |                       | 1        |     | 56          | 33         | 55          | 450          | 13          |            | 1            |
| 26601 01  | FIELD FEEDING KIT COMPANY LV  |            |                       | 14       | R   | 254         | 91         | 93          | 5480         | 2247        | 38         | 435          |
| L28351 03 | KITCHEN FIELD TLR MFK75A      |            |                       | 7        | R   | 178         | 93         | 94          | 4200         | 805         | 15         | 158          |
| 154 02    | RANGE OUTFIT FIELD M59        |            |                       | 14       |     | 27          | 24         | 42          | 253          | 63          | 2          | 6            |
| 399 04    | SANITATION CENTER             |            | DRAIN TABLE           | 7        |     | 49          | 27         | 38          | 41           | 64          |            | 5            |
| 33399 08  | SANITATION CENTER             |            | WORK TABLE            | 7        |     | 56          | 26         | 38          | 57           | 71          |            | 6            |
| 7679 01   | TRK UTIL, HVY M99LV M1097     |            |                       | 6        | R   | 191         | 86         | 72          | 5600         | 684         | 17         | 103          |
| 1494 04   | TRK UTIL CRG/TRP C M998       |            |                       | 22       | R   | 181         | 84         | 53          | 5280         | 2323        | 58         | 256          |
| V19950 01 | TANK UNIT LIQ DSPN TK L2Q DIS |            |                       | 1        |     | 73          | 61         | 56          | 410          | 31          |            | 4            |
| V8441 02  | TENT FRAME TYPE MA            |            | FRAME SECTIONS        | 1        |     | 133         | 29         | 26          | 605          | 27          |            | 1            |
| 8441 03   | TENT FRAME TYPE MA            |            | FRAME SECTIONS        | 1        |     | 188         | 21         | 21          | 615          | 27          |            | 1            |
| 8441 04   | TENT FRAME TYPE MA            |            | FRAME SECTIONS        | 3        |     | 134         | 12         | 25          | 274          | 34          |            | 2            |
| M32730 01 | SHOP EQUIP AUTMV L S/E AUTO C |            |                       | 1        |     | 167         | 87         | 84          | 4460         | 101         | 2          | 18           |
| 537 02    | TRAILER CARGO 3/4 M101A1      |            |                       | 4        | R   | 147         | 74         | 50          | 1350         | 302         | 3          | 31           |
| 5811 02   | TRAILER CARGO 1-1/ M105A2     |            |                       | 2        | R   | 166         | 83         | 55          | 2670         | 191         | 3          | 22           |
| V98825 23 | TRAILER TANK WATER M149A2     |            |                       | 7        | R   | 162         | 81         | 81          | 2912         | 638         | 10         | 108          |
| 710439 02 | TRUCK CARGO 5 TON MTV W/E     |            |                       | 10       | R   | 275         | 96         | 102         | 32207        | 1833        | 161        | 390          |
| 0712 01   | TRLR CGO MTV W/DPS NONE       |            |                       | 1        | R   | 220         | 96         | 58          | 4733         | 147         | 2          | 18           |
| 22222X 99 | Total Accompanying Supply --  |            |                       |          |     |             |            |             | 28735        | 180         | 14         | 36           |
| 22222Y 99 | Total Ammunition -----        |            |                       |          |     |             |            |             | 1664         | 4           | 1          | 1            |
| 2222 99   | Total Aggregate TOE * ---     |            |                       |          |     |             |            |             | 53533        | 424         | 27         | 85           |
|           |                               |            |                       |          |     |             |            |             |              | 10526       | 359        | 1716         |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

ALTERNATIVE 2

(HEAVY)

Date - 18-OCT-93

## UNIT EQUIPMENT LIST

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INF BN (MECH)

SRC - 07245L000

Authorized Personnel Strength - 810

2 Multiples of Unit in Force

| IN     | NDX | Nomenclature        | Model      | Component Description | Auth Qty | Veh | Length (IN) | Width (IN) | Height (IN) | Weight (LBS) | Square Feet | Short Tons | Measure Tons |
|--------|-----|---------------------|------------|-----------------------|----------|-----|-------------|------------|-------------|--------------|-------------|------------|--------------|
| A79381 | 01  | ANTENNA GROUP       | OE-254(1)G |                       | 32       |     | 43          | 40         | 40          | 48           | 382         | 1          | 32           |
| 0990   | 02  | CARRIER: MORTAR SY  | M1064      |                       | 6        | NR  | 210         | 106        | 80          | 27635        | 927         | 83         | 155          |
| 8234   | 02  | CARRIER PERSONNEL   | M113A3     |                       | 17       | NR  | 208         | 100        | 81          | 23880        | 2456        | 203        | 414          |
| C32887 | 02  | CLEANER STM WHL MT  | NONE       |                       | 1        | R   | 100         | 72         | 89          | 2780         | 50          | 1          | 9            |
| D11538 | 02  | CARRIER COMD P FTR  | M577A1     |                       | 5        | NR  | 192         | 100        | 104         | 22415        | 667         | 56         | 144          |
| 6896   | 04  | COMBAT VEH IMP TOW  | M901A1     |                       | 12       | NR  | 189         | 100        | 102         | 30000        | 1575        | 180        | 335          |
| E69242 | 03  | COMP RCP AIR PUR D  | C-20X-80/6 |                       | 1        |     | 65          | 25         | 40          | 610          | 11          |            | 1            |
| F40375 | 01  | FIGHTING VEHICLE M  | M2A2       |                       | 58       | NR  | 258         | 140        | 120         | 65692        | 14548       | 1905       | 3637         |
| 0462   | 01  | FIGHTING VEHICLE F  | M3A1       |                       | 2        | NR  | 258         | 126        | 117         | 48896        | 452         | 49         | 110          |
| 0530   | 01  | FIGHTING VEHICLE M  | M3A2       |                       | 4        | NR  | 258         | 140        | 120         | 66027        | 1003        | 132        | 251          |
| G11966 | 01  | GEN SET: DED SKD M  | MEP 802A   |                       | 1        |     | 50          | 32         | 36          | 825          | 11          |            | 1            |
| 75813  | 01  | GEN SET DED SKW     | MEP 002A   |                       | 1        |     | 51          | 32         | 36          | 940          | 11          |            | 1            |
| 4862   | 16  | HEATER DUCT TYPE P  | VB67-GFC3  |                       | 1        |     | 56          | 33         | 55          | 450          | 13          |            | 1            |
| K28601 | 01  | FIELD FEEDING KIT   | COMPANY LV |                       | 5        | R   | 254         | 91         | 93          | 5480         | 803         | 14         | 155          |
| L28351 | 03  | KITCHEN FIELD TLR   | MFK75A     |                       | 4        | R   | 178         | 93         | 94          | 4200         | 460         | 8          | 90           |
| 8405   | 01  | BMS-120TOWEDLTWRT   | K6A1       |                       | 6        | R   | 95          | 60         | 45          | 720          | 238         | 2          | 22           |
| 4154   | 02  | RANGE OUTFIT FIELD  | M59        |                       | 8        |     | 27          | 24         | 42          | 253          | 36          | 1          | 3            |
| R50681 | 04  | RECOVERY VEH FTRAC  | M88A1      |                       | 7        | NR  | 323         | 144        | 124         | 107840       | 2261        | 377        | 584          |
| 6742   | 02  | REEL EQUIPMENT      |            | STAND                 | 68       |     | 6           | 24         | 36          | 32           | 68          | 1          | 5            |
| 3399   | 04  | SANITATION CENTER   |            | DRAIN TABLE           | 4        |     | 49          | 27         | 38          | 41           | 37          |            | 3            |
| S33399 | 08  | SANITATION CENTER   |            | WORK TABLE            | 4        |     | 56          | 26         | 38          | 57           | 40          |            | 3            |
| T00161 | 01  | TEST STAND ENGINE   | NONE       |                       | 1        |     | 92          | 48         | 23          | 666          | 31          |            | 1            |
| 0474   | 01  | SHELTER SYS TLR MT  | M51        |                       | 2        | R   | 168         | 85         | 96          | 5360         | 198         | 5          | 40           |
| T59518 | 02  | TRUCK CARGO 10T 8X  | M977WMM    |                       | 5        | R   | 401         | 96         | 101         | 38800        | 1337        | 97         | 281          |
| T59278 | 02  | TRUCK CARGO 10 T 8  | M977 WMM   |                       | 8        | R   | 401         | 96         | 101         | 38800        | 2439        | 155        | 450          |
| 51494  | 04  | TRK UTIL CRG/TRP C  | M998       |                       | 32       | R   | 181         | 84         | 53          | 5280         | 3379        | 84         | 373          |
| 3093   | 02  | TRUCK WRECKER 8X8   | M984 W/W   |                       | 1        | R   | 384         | 101        | 101         | 43180        | 269         | 22         | 57           |
| T87243 | 02  | TRK TANK 2500 GAL   | M978 WMM   |                       | 8        | R   | 401         | 96         | 101         | 38165        | 2139        | 153        | 450          |
| 8441   | 02  | TENT FRAME TYPE MA  |            | FRAME SECTIONS        | 1        |     | 133         | 29         | 26          | 605          | 27          |            | 1            |
| 8441   | 03  | TENT FRAME TYPE MA  |            | FRAME SECTIONS        | 1        |     | 188         | 21         | 21          | 615          | 27          |            | 1            |
| V48441 | 04  | TENT FRAME TYPE MA  |            | FRAME SECTIONS        | 3        |     | 134         | 12         | 25          | 274          | 34          |            | 2            |
| 12593  | 02  | SHOP EQUIP AUTHV L  |            | MULTIPLE ITEMS        | 5        |     | 70          | 40         | 36          | 1002         | 97          | 3          | 7            |
| 2730   | 01  | SHOP EQUIP AUTHV L  | S/E AUTO C |                       | 1        |     | 167         | 87         | 84          | 4460         | 101         | 2          | 18           |
| 48391  | 04  | WLD SHOP TLR MTD    | NONE       |                       | 1        | R   | 179         | 96         | 97          | 7355         | 119         | 4          | 24           |
| W65747 | 05  | TOOL KIT VEH FTRAC  |            | WELDER                | 1        |     | 64          | 37         | 37          | 1130         | 16          | 1          | 1            |
| 9825   | 23  | TRAILER TANK WATER  | M149A2     |                       | 10       | R   | 162         | 81         | 81          | 2912         | 911         | 15         | 154          |
| 0009   | 02  | TRUCK CARGO 2 1/2   | M35A2      |                       | 2        | R   | 265         | 96         | 81          | 13180        | 353         | 13         | 60           |
| X40146 | 02  | TRUCK CARGO 2-1/2   | M35A2 WMM  |                       | 6        | R   | 279         | 96         | 81          | 13570        | 1116        | 41         | 188          |
| 0794   | 15  | TRK CGO D/S 5 TON   | M923A1     |                       | 4        | R   | 311         | 97         | 94          | 22175        | 838         | 44         | 164          |
| 06157  | 01  | ARMED MAINTENANCE V | NONE       |                       | 6        | NR  | 283         | 117        | 116         | 56000        | 1380        | 168        | 333          |
| Z36068 | 01  | TRAILER CARGO 2 1/  | LMTV       |                       | 34       | R   | 209         | 96         | 58          | 2491         | 4737        | 42         | 572          |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

Date - 18-OCT-93

UNIT EQUIPMENT LIST

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INF BN (MECH)

SRC - 07245L000

Authorized Personnel Strength - 810

2 Multiples of Unit in Force

|        | NDX | Nomenclature              | Model      | Component<br>Description | Auth<br>Qty | Veh | Length<br>(IN) | Width<br>(IN) | Height<br>(IN) | Weight<br>(LBS) | Square<br>Feet | Short<br>Tons | Measure<br>Tons |
|--------|-----|---------------------------|------------|--------------------------|-------------|-----|----------------|---------------|----------------|-----------------|----------------|---------------|-----------------|
| 240337 | 08  | TRUCK CARGO 5 TON         | MTV LWB W/ |                          | 4           | R   | 352            | 96            | 102            | 33613           | 939            | 67            | 199             |
| 240430 | 02  | TRUCK CARGO 2 1/2         | 4X4 LMTV W |                          | 32          | R   | 254            | 96            | 102            | 24013           | 5419           | 384           | 1151            |
| 0712   | 01  | TRLR CGO MTV W/DPS        | NONE       |                          | 21          | R   | 220            | 96            | 58             | 4733            | 3080           | 50            | 372             |
| 293558 | 08  | TRUCK CARGO MTV LW        | W/MHE W/E  |                          | 10          | R   | 386            | 96            | 102            | 37314           | 2573           | 187           | 547             |
| 294047 | 02  | TRUCK TANK                | POL MTV W/ |                          | 7           | R   | 314            | 96            | 102            | 26130           | 1465           | 91            | 311             |
| 4433   | 02  | TRUCK WRECKER             | MTV W/W W/ |                          | 1           | R   | 352            | 96            | 102            | 34826           | 235            | 17            | 50              |
| ZZZX   | 99  | Total Accompanying Supply | --         |                          |             |     |                |               |                | 177674          | 1111           | 89            | 222             |
| ZZZZZY | 99  | Total Ammunition          | -----      |                          |             |     |                |               |                | 10287           | 25             | 5             | 5               |
| ZZZZ   | 99  | Total Aggregate TOE *     | ---        |                          |             |     |                |               |                | 233308          | 1736           | 117           | 347             |
|        |     |                           |            |                          |             |     |                |               |                |                 | 61880          | 4872          | 12342           |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

Date - 18-OCT-93

## UNIT EQUIPMENT LIST

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MLOS COMPANY ALT 1 MVY

SRC - 07348T000

Authorized Personnel Strength - 77

1 Multiples of Unit in Force

| NDX       | Nomenclature          | Model      | Component Description | Auth Qty | Veh | Length (IN) | Width (IN) | Height (IN) | Weight (LBS) | Square Feet | Short Tons | Measure Tons |
|-----------|-----------------------|------------|-----------------------|----------|-----|-------------|------------|-------------|--------------|-------------|------------|--------------|
| A79381 01 | ANTENNA GROUP         | OE-254(1)G |                       | 6        |     | 43          | 40         | 40          | 48           | 72          |            | 6            |
| C10990 02 | CARRIER: MORTAR SY    | M1064      |                       | 12       | NR  | 210         | 106        | 80          | 27635        | 1855        | 166        | 309          |
| 0234 02   | CARRIER PERSONNEL     | M113A3     |                       | 4        | NR  | 208         | 100        | 81          | 23880        | 578         | 48         | 98           |
| 041538 02 | CARRIER COND P FTR    | M577A1     |                       | 1        | NR  | 192         | 100        | 104         | 22415        | 133         | 11         | 29           |
| F55553 01 | DISTR/ILLUM SET EL    | 1PH/60AMP  |                       | 1        |     | 60          | 36         | 36          | 400          | 15          |            | 1            |
| 0966 01   | GEN SET: DED SKD M    | MEP 802A   |                       | 1        |     | 50          | 32         | 36          | 825          | 11          |            | 1            |
| 0742 02   | REEL EQUIPMENT        |            | STAND                 | 15       |     | 6           | 24         | 36          | 32           | 15          |            | 1            |
| T39518 02 | TRUCK CARGO 10T 8X    | M977WM     |                       | 3        | R   | 401         | 96         | 101         | 38800        | 802         | 58         | 169          |
| T44494 04 | TRK UTIL CRG/TRP C    | M998       |                       | 4        | R   | 181         | 84         | 53          | 5280         | 422         | 11         | 47           |
| V4441 02  | TENT FRAME TYPE MA    |            | FRAME SECTIONS        | 1        |     | 133         | 29         | 26          | 605          | 27          |            | 1            |
| V4441 03  | TENT FRAME TYPE MA    |            | FRAME SECTIONS        | 1        |     | 188         | 21         | 21          | 615          | 27          |            | 1            |
| V4441 04  | TENT FRAME TYPE MA    |            | FRAME SECTIONS        | 3        |     | 134         | 12         | 25          | 274          | 34          |            | 2            |
| V4593 02  | SHOP EQUIP AUTHV L    |            | MULTIPLE ITEMS        | 1        |     | 70          | 40         | 36          | 1002         | 19          | 1          | 1            |
| V4747 05  | TOOL KIT VEH FTRAC    |            | WELDER                | 1        |     | 64          | 37         | 37          | 1130         | 16          | 1          | 1            |
| V98825 23 | TRAILER TANK WATER    | M149A2     |                       | 1        | R   | 162         | 81         | 81          | 2912         | 91          | 1          | 15           |
| Z0890 01  | HEATER DUCT TYPE P    | 150000BT U |                       | 1        |     | 62          | 41         | 60          | 650          | 18          |            | 2            |
| Z0068 01  | TRAILER CARGO 2 1/    | LNTV       |                       | 3        | R   | 209         | 96         | 58          | 2491         | 418         | 4          | 51           |
| Z40430 02 | TRUCK CARGO 2 1/2     | 4X4 LNTV W |                       | 4        | R   | 254         | 96         | 102         | 24013        | 677         | 48         | 144          |
| Z42313 01 | RECOVERY VEHICLE      | M88A1E1    |                       | 1        | NR  | 326         | 135        | 118         | 129000       | 306         | 65         | 75           |
| Z4047 02  | TRUCK TANK            | POL MTV W/ |                       | 1        | R   | 314         | 96         | 102         | 26130        | 209         | 13         | 44           |
| Z4433 02  | TRUCK WRECKER         | MTV W/W W/ |                       | 1        | R   | 352         | 96         | 102         | 34826        | 235         | 17         | 50           |
| Z22222 99 | Total Aggregate TOE * | ---        |                       |          |     |             |            |             | 30233        | 200         | 15         | 40           |
|           |                       |            |                       |          |     |             |            |             |              | 6180        | 460        | 1089         |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

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## UNIT EQUIPMENT LIST

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## TANK BATTALION (HVV DIV)

SRC - 17375L000

Authorized Personnel Strength - 587

2 Multiples of Unit in Force

| LN     | MDX | Nomenclature                  | Model      | Component<br>Description | Auth<br>Qty | Veh | Length<br>(IN) | Width<br>(IN) | Height<br>(IN) | Weight<br>(LBS) | Square<br>Feet | Short<br>Tons | Measure<br>Tons |
|--------|-----|-------------------------------|------------|--------------------------|-------------|-----|----------------|---------------|----------------|-----------------|----------------|---------------|-----------------|
| A19381 | 01  | ANTENNA GROUP                 | OE-254(1)G |                          | 21          |     | 43             | 40            | 40             | 48              | 251            | 1             | 21              |
| C10990 | 02  | CARRIER: MORTAR SY            | M1064      |                          | 6           | MR  | 210            | 106           | 80             | 27635           | 927            | 83            | 155             |
| 234    | 02  | CARRIER PERSONNEL             | M113A3     |                          | 13          | MR  | 208            | 100           | 81             | 23880           | 1878           | 155           | 317             |
| 2887   | 02  | CLEANER STM WNL MT            | NONE       |                          | 1           | R   | 100            | 72            | 89             | 2780            | 50             | 1             | 9               |
| D11538 | 02  | CARRIER COMD P FTR            | M577A1     |                          | 5           | MR  | 192            | 100           | 104            | 22415           | 667            | 56            | 144             |
| 2242   | 03  | COMP RCP AIR PWR D            | C-20X-80/6 |                          | 1           |     | 65             | 25            | 40             | 610             | 11             |               | 1               |
| 485    | 01  | FEEDER SYS ELECT              | 3PH 40AMP  |                          | 2           |     | 60             | 36            | 36             | 400             | 30             |               | 2               |
| F55621 | 01  | FEEDER SYS ELECT              | 3PH 100AMP |                          | 1           |     | 84             | 48            | 48             | 700             | 28             |               | 3               |
| E60530 | 01  | FIGHTING VEHICLE H            | M3A2       |                          | 6           | MR  | 258            | 140           | 120            | 66027           | 1505           | 198           | 376             |
| 813    | 01  | GEN SET DED 5KW               | MEP 002A   |                          | 2           |     | 51             | 32            | 36             | 940             | 23             | 1             | 2               |
| 862    | 16  | HEATER DUCT TYPE P            | V867-GFC3  |                          | 1           |     | 56             | 33            | 55             | 450             | 13             |               | 1               |
| K28601 | 01  | FIELD FEEDING KIT             | COMPANY LV |                          | 4           | R   | 254            | 91            | 93             | 5480            | 642            | 11            | 124             |
| 351    | 03  | KITCHEN FIELD TLR             | MFK75A     |                          | 3           | R   | 178            | 93            | 94             | 4200            | 345            | 6             | 68              |
| 405    | 01  | BMS-120TOWEDLTORT             | K6A1       |                          | 6           | R   | 95             | 60            | 45             | 720             | 238            | 2             | 22              |
| R14154 | 02  | RANGE OUTFIT FIELD            | M59        |                          | 6           |     | 27             | 24            | 42             | 253             | 27             | 1             | 2               |
| 50681  | 04  | RECOVERY VEN FTRAC            | M88A1      |                          | 7           | MR  | 323            | 144           | 124            | 107840          | 2261           | 377           | 584             |
| 5742   | 02  | REEL EQUIPMENT                |            | STAND                    | 38          |     | 6              | 24            | 36             | 32              | 38             | 1             | 3               |
| S33399 | 04  | SANITATION CENTER             |            | DRAIN TABLE              | 3           |     | 49             | 27            | 38             | 41              | 28             |               | 2               |
| S33399 | 08  | SANITATION CENTER             |            | WORK TABLE               | 3           |     | 56             | 26            | 38             | 57              | 30             |               | 2               |
| 161    | 01  | TEST STAND ENGINE             | NONE       |                          | 1           |     | 92             | 48            | 23             | 666             | 31             |               | 1               |
| 474    | 01  | SHELTER SYS TLR MT            | M51        |                          | 2           | R   | 168            | 85            | 96             | 5360            | 198            | 5             | 40              |
| T39518 | 02  | TRUCK CARGO 10T 8X            | M977WAM    |                          | 5           | R   | 401            | 96            | 101            | 38800           | 1337           | 97            | 281             |
| 278    | 02  | TRUCK CARGO 10 T 8            | M977 WOWN  |                          | 10          | R   | 401            | 96            | 101            | 38800           | 2673           | 194           | 563             |
| 494    | 04  | TRK UTIL CRG/TRP C            | M998       |                          | 30          | R   | 181            | 84            | 53             | 5280            | 3167           | 79            | 350             |
| T63093 | 02  | TRUCK WRECKER 8X8             | M984 W/W   |                          | 1           | R   | 384            | 101           | 101            | 43180           | 269            | 22            | 57              |
| T87243 | 02  | TRK TANK 2500 GAL             | M978 WOWN  |                          | 23          | R   | 401            | 96            | 101            | 38165           | 6149           | 439           | 1294            |
| 883    | 02  | TRAILER FLATBED 5             | M1061A1    |                          | 1           | R   | 223            | 98            | 40             | 5850            | 152            | 3             | 13              |
| V12141 | 53  | TANK&PUMP UNIT LIQ            |            | TANK                     | 2           |     | 72             | 61            | 52             | 475             | 61             |               | 7               |
| V12141 | 54  | TANK&PUMP UNIT LIQ            |            | PUMP                     | 1           |     | 79             | 32            | 50             | 800             | 18             |               | 2               |
| 9950   | 01  | TANK UNIT LIQ DSPH TK LIQ DIS |            |                          | 1           |     | 73             | 61            | 56             | 410             | 31             |               | 4               |
| 441    | 02  | TENT FRAME TYPE MA            |            | FRAME SECTIONS           | 1           |     | 133            | 29            | 26             | 605             | 27             |               | 1               |
| V48441 | 03  | TENT FRAME TYPE MA            |            | FRAME SECTIONS           | 1           |     | 188            | 21            | 21             | 615             | 27             |               | 1               |
| 441    | 04  | TENT FRAME TYPE MA            |            | FRAME SECTIONS           | 3           |     | 134            | 12            | 25             | 274             | 34             |               | 2               |
| 2730   | 01  | SHOP EQUIP AUTMV L S/E AUTO C |            |                          | 1           |     | 167            | 87            | 84             | 4460            | 101            | 2             | 18              |
| W48391 | 04  | WLD SHOP TLR MTD              | NONE       |                          | 1           | R   | 179            | 96            | 97             | 7355            | 119            | 4             | 24              |
| W5747  | 05  | TOOL KIT VEH FTRAC            |            | WELDER                   | 1           |     | 64             | 37            | 37             | 1130            | 16             | 1             | 1               |
| 5811   | 02  | TRAILER CARGO 1-1/            | M105A2     |                          | 19          | R   | 166            | 83            | 55             | 2670            | 1818           | 25            | 208             |
| 99825  | 23  | TRAILER TANK WATER            | M149A2     |                          | 8           | R   | 162            | 81            | 81             | 2912            | 729            | 12            | 123             |
| X40009 | 02  | TRUCK CARGO 2 1/2             | M35A2      |                          | 22          | R   | 265            | 96            | 81             | 13180           | 3887           | 145           | 656             |
| 0146   | 02  | TRUCK CARGO 2-1/2             | M35A2 WAM  |                          | 5           | R   | 279            | 96            | 81             | 13570           | 930            | 34            | 157             |
| 0794   | 15  | TRK CGO D/S 5 TON             | M923A1     |                          | 5           | R   | 311            | 97            | 94             | 22175           | 1047           | 55            | 205             |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

Date - 18-OCT-93

## UNIT EQUIPMENT LIST

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TANK BATTALION (NAVY DIV)

SRC - 17375L000

Authorized Personnel Strength - 587

2 Multiples of Unit in Force

| NDX       | Nomenclature                 | Model      | Component<br>Description | Auth<br>Qty | Veh | Length<br>(IN) | Width<br>(IN) | Height<br>(IN) | Weight<br>(LBS) | Square<br>Feet | Short<br>Tons | Measure<br>Tons |
|-----------|------------------------------|------------|--------------------------|-------------|-----|----------------|---------------|----------------|-----------------|----------------|---------------|-----------------|
| 206157 01 | ARMED MAINTENANCE V NONE     |            |                          | 4           | NR  | 283            | 117           | 116            | 56000           | 920            | 112           | 222             |
| 0430 02   | TRUCK CARGO 2 1/2 4X4 LMTV W |            |                          | 4           | R   | 254            | 96            | 102            | 24013           | 677            | 48            | 144             |
| 07258 04  | TANK COMBAT FULL T M1A1E2    |            |                          | 58          | NR  | 360            | 144           | 114            | 123780          | 20880          | 3590          | 4959            |
| 294433 02 | TRUCK WRECKER                | MTV W/W W/ |                          | 1           | R   | 352            | 96            | 102            | 34826           | 235            | 17            | 50              |
| 22222X 99 | Total Accompanying Supply -- |            |                          |             |     |                |               |                | 128758          | 805            | 64            | 161             |
| 2222Y 99  | Total Ammunition -----       |            |                          |             |     |                |               |                | 7455            | 18             | 4             | 4               |
| 22222 99  | Total Aggregate TOE * ---    |            |                          |             |     |                |               |                | 188749          | 1276           | 94            | 255             |
|           |                              |            |                          |             |     |                |               |                |                 | 56623          | 5944          | 11641           |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

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## UNIT EQUIPMENT LIST

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HMC INF DIV (MECH) BDE

SRC - 87042L200

Authorized Personnel Strength - 85

1 Multiples of Unit in Force

| N      | NDX | Nomenclature              | Model      | Component Description | Auth Qty | Veh | Length (IN) | Width (IN) | Height (IN) | Weight (LBS) | Square Feet | Short Tons | Measure Tons |
|--------|-----|---------------------------|------------|-----------------------|----------|-----|-------------|------------|-------------|--------------|-------------|------------|--------------|
| A79381 | 01  | ANTENNA GROUP             | OE-254(1)G |                       | 11       |     | 43          | 40         | 40          | 48           | 131         |            | 11           |
| 8234   | 02  | CARRIER PERSONNEL         | M113A3     |                       | 1        | NR  | 208         | 100        | 81          | 23880        | 144         | 12         | 24           |
| 2887   | 02  | CLEANER STM WNL MT        | NONE       |                       | 1        | R   | 100         | 72         | 89          | 2780         | 50          | 1          | 9            |
| D11538 | 02  | CARRIER COND P FTR        | M577A1     |                       | 1        | NR  | 192         | 100        | 104         | 22415        | 133         | 11         | 29           |
| E55553 | 01  | DISTR/ILLUM SET EL        | 1PH/60AMP  |                       | 1        |     | 60          | 36         | 36          | 400          | 15          |            | 1            |
| 1966   | 01  | GEN SET: DED SKD M        | MEP 802A   |                       | 2        |     | 50          | 32         | 36          | 825          | 22          | 1          | 2            |
| 5404   | 02  | RADIO SET HIGH FRE        |            | RADIO                 | 2        |     | 27          | 20         | 40          | 130          | 8           |            | 1            |
| J35813 | 01  | GEN SET DED SKW           | MEP 002A   |                       | 1        |     | 51          | 32         | 36          | 940          | 11          |            | 1            |
| 4862   | 16  | HEATER DUCT TYPE P        | VB67-GFC3  |                       | 1        |     | 56          | 33         | 55          | 450          | 13          |            | 1            |
| 8601   | 01  | FIELD FEEDING KIT         | COMPANY LV |                       | 1        | R   | 254         | 91         | 93          | 5480         | 161         | 3          | 31           |
| L28351 | 03  | KITCHEN FIELD TLR         | MFK75A     |                       | 1        | R   | 178         | 93         | 94          | 4200         | 115         | 2          | 23           |
| 14154  | 02  | RANGE OUTFIT FIELD        | M59        |                       | 2        |     | 27          | 24         | 42          | 253          | 9           |            | 1            |
| 0544   | 02  | RECOVERY VEH FTRAC        | M578       |                       | 1        | NR  | 254         | 124        | 115         | 49320        | 219         | 25         | 52           |
| 333399 | 04  | SANITATION CENTER         |            | DRAIN TABLE           | 1        |     | 49          | 27         | 38          | 41           | 9           |            | 1            |
| 333399 | 08  | SANITATION CENTER         |            | WORK TABLE            | 1        |     | 56          | 26         | 38          | 57           | 10          |            | 1            |
| 1694   | 04  | TRK UTIL CRG/TRP C        | M998       |                       | 14       | R   | 181         | 84         | 53          | 5280         | 1478        | 37         | 163          |
| 2141   | 53  | TANK&PUMP UNIT LIQ        |            | TANK                  | 2        |     | 72          | 61         | 52          | 475          | 61          |            | 7            |
| V12141 | 54  | TANK&PUMP UNIT LIQ        |            | PUMP                  | 1        |     | 79          | 32         | 50          | 800          | 18          |            | 2            |
| 8441   | 02  | TENT FRAME TYPE MA        |            | FRAME SECTIONS        | 1        |     | 133         | 29         | 26          | 605          | 27          |            | 1            |
| 8441   | 03  | TENT FRAME TYPE MA        |            | FRAME SECTIONS        | 1        |     | 188         | 21         | 21          | 615          | 27          |            | 1            |
| V48441 | 04  | TENT FRAME TYPE MA        |            | FRAME SECTIONS        | 3        |     | 134         | 12         | 25          | 274          | 34          |            | 2            |
| 32593  | 02  | SHOP EQUIP AUTHV L        |            | MULTIPLE ITEMS        | 1        |     | 70          | 40         | 36          | 1002         | 19          | 1          | 1            |
| 5747   | 05  | TOOL KIT VEH FTRAC        |            | WELDER                | 1        |     | 64          | 37         | 37          | 1130         | 16          | 1          | 1            |
| W5400  | 13  | TRAILER CARGO 1/4         | M416A1     |                       | 2        | R   | 108         | 61         | 43          | 620          | 92          | 1          | 8            |
| W95811 | 02  | TRAILER CARGO 1-1/        | M105A2     |                       | 1        | R   | 166         | 83         | 55          | 2670         | 96          | 1          | 11           |
| 8825   | 23  | TRAILER TANK WATER        | M149A2     |                       | 1        | R   | 162         | 81         | 81          | 2912         | 91          | 1          | 15           |
| 0146   | 02  | TRUCK CARGO 2-1/2         | M35A2 WAM  |                       | 1        | R   | 279         | 96         | 81          | 13570        | 186         | 7          | 31           |
| X40831 | 20  | TRK CGO 5 TON LMB         | M924A1     |                       | 1        | R   | 311         | 97         | 94          | 22070        | 209         | 11         | 41           |
| 0833   | 02  | TRUCK UTILITY 1/4         | M151A2     |                       | 2        | R   | 132         | 64         | 53          | 2450         | 117         | 2          | 13           |
| 6068   | 01  | TRAILER CARGO 2 1/        | LMTV       |                       | 1        | R   | 209         | 96         | 58          | 2491         | 139         | 1          | 17           |
| 240430 | 02  | TRUCK CARGO 2 1/2         | 4X4 LMTV W |                       | 3        | R   | 254         | 96         | 102         | 24013        | 508         | 36         | 108          |
| 22222X | 99  | Total Accompanying Supply | --         |                       |          |     |             |            |             | 18645        | 117         | 9          | 23           |
| 2222Y  | 99  | Total Ammunition          | -----      |                       |          |     |             |            |             | 1080         | 3           | 1          | 1            |
| 222222 | 99  | Total Aggregate TOE *     | ---        |                       |          |     |             |            |             | 37311        | 272         | 19         | 54           |
|        |     |                           |            |                       |          |     |             |            |             |              | 4560        | 186        | 689          |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

ALTERNATIVE 2

(LIGHT)

INF BN (LIGHT)  
SRC - 07015L000  
Authorized Personnel Strength - 561  
3 Multiples of Unit in Force

| LN     | NDX | Nomenclature                 | Model      | Component Description | Auth Qty | Veh | Length (IN) | Width (IN) | Height (IN) | Weight (LBS) | Square Feet | Short Tons | Measure Tons |
|--------|-----|------------------------------|------------|-----------------------|----------|-----|-------------|------------|-------------|--------------|-------------|------------|--------------|
| 7381   | 01  | ANTENNA GROUP                | OE-254(1)G |                       | 15       |     | 43          | 40         | 40          | 48           | 179         |            | 15           |
| 668966 | 01  | DRUM FABRIC FUEL             | 500 GAL CA |                       | 2        |     | 74          | 35         | 18          | 233          | 36          |            | 1            |
| 742    | 02  | REEL EQUIPMENT               |            | STAND                 | 25       |     | 6           | 24         | 36          | 32           | 25          |            | 2            |
| 474    | 01  | SHELTER SYS TLR MT M51       |            |                       | 2        | R   | 168         | 85         | 96          | 5360         | 198         | 5          | 40           |
| 105096 | 01  | TRK UTIL TOW CAR 1 M966      |            |                       | 4        | R   | 180         | 85         | 74          | 7195         | 425         | 14         | 66           |
| 10844  | 01  | TRK AMB 4 LITTER 4 M997      |            |                       | 4        | R   | 204         | 86         | 101         | 7500         | 487         | 15         | 103          |
| 494    | 04  | TRK UTIL CRG/TRP C M998      |            |                       | 23       | R   | 181         | 84         | 53          | 5280         | 2428        | 61         | 268          |
| 161562 | 04  | TRK UTIL CGO/TRP C M1038 W/W |            |                       | 4        | R   | 179         | 84         | 53          | 5200         | 418         | 10         | 46           |
| 22222X | 99  | Total Accompanying Supply    | --         |                       |          |     |             |            |             | 120862       | 756         | 60         | 151          |
| 2222Y  | 99  | Total Ammunition             | -----      |                       |          |     |             |            |             | 6998         | 17          | 3          | 3            |
| 2222Z  | 99  | Total Aggregate TOE *        | ---        |                       |          |     |             |            |             | 60561        | 456         | 30         | 91           |
|        |     |                              |            |                       |          |     |             |            |             |              | 5426        | 201        | 786          |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

Date - 18-OCT-93

UNIT EQUIPMENT LIST

Page

2

NLOS CO (Light)

alt 2 from lgt

SRC - 07348T200

Authorized Personnel Strength - 57

1 Multiples of Unit in Force

|        | NDX | Nomenclature          | Model      | Component<br>Description | Auth<br>Qty | Veh | Length<br>(IN) | Width<br>(IN) | Height<br>(IN) | Weight<br>(LBS) | Square<br>Feet | Short<br>Tons | Measure<br>Tons |
|--------|-----|-----------------------|------------|--------------------------|-------------|-----|----------------|---------------|----------------|-----------------|----------------|---------------|-----------------|
| A79381 | 01  | ANTENNA GROUP         | OE-254(1)G |                          | 5           |     | 43             | 40            | 40             | 48              | 60             |               | 5               |
| P56742 | 02  | REEL EQUIPMENT        |            | STAND                    | 15          |     | 6              | 24            | 36             | 32              | 15             |               | 1               |
| 7679   | 01  | TRK UTIL, HVY HMMV    | M1097      |                          | 12          | R   | 191            | 86            | 72             | 5600            | 1369           | 34            | 205             |
| 759518 | 02  | TRUCK CARGO 10T 8X    | M977WMM    |                          | 3           | R   | 401            | 96            | 101            | 38800           | 802            | 58            | 169             |
| T61494 | 04  | TRK UTIL CRG/TRP C    | M998       |                          | 5           | R   | 181            | 84            | 53             | 5280            | 528            | 13            | 58              |
| 3093   | 02  | TRUCK WRECKER 8X8     | M984 W/W   |                          | 1           | R   | 384            | 101           | 101            | 43180           | 269            | 22            | 57              |
| 7243   | 02  | TRK TANK 2500 GAL     | M978 WOWN  |                          | 1           | R   | 401            | 96            | 101            | 38165           | 267            | 19            | 56              |
| T92242 | 01  | TRK UTILITY 1-1/4     | M1025      |                          | 12          | R   | 180            | 85            | 74             | 6104            | 1275           | 37            | 197             |
| 5537   | 02  | TRAILER CARGO 3/4     | M101A1     |                          | 12          | R   | 147            | 74            | 50             | 1350            | 907            | 8             | 94              |
| 8825   | 23  | TRAILER TANK WATER    | M149A2     |                          | 1           | R   | 162            | 81            | 81             | 2912            | 91             | 1             | 15              |
| 240430 | 02  | TRUCK CARGO 2 1/2 4X4 | LMTV W     |                          | 1           | R   | 254            | 96            | 102            | 24013           | 169            | 12            | 36              |
| 222222 | 99  | Total Aggregate TOE * | ---        |                          |             |     |                |               |                | 13808           | 115            | 7             | 23              |
|        |     |                       |            |                          |             |     |                |               |                |                 | 5867           | 211           | 917             |

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Date - 18-OCT-93

## UNIT EQUIPMENT LIST

Page

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MHC INF DIV 80E (LID)

SRC - 77042L000

Authorized Personnel Strength - 131

1 Multiples of Unit in Force

| M      | NDX | Nomenclature                  | Model      | Component Description | Auth Qty | Veh | Length (IN) | Width (IN) | Height (IN) | Weight (LBS) | Square Feet | Short Tons | Measure Tons |
|--------|-----|-------------------------------|------------|-----------------------|----------|-----|-------------|------------|-------------|--------------|-------------|------------|--------------|
| A79381 | 01  | ANTENNA GROUP                 | OE-254(1)G |                       | 13       |     | 43          | 40         | 40          | 48           | 155         |            | 13           |
| C32887 | 02  | CLEANER STM WHL NT NONE       |            |                       | 1        | R   | 100         | 72         | 89          | 2780         | 50          | 1          | 9            |
| S5553  | 01  | DISTR/ILLUM SET EL 1PH/60AMP  |            |                       | 4        |     | 60          | 36         | 36          | 400          | 60          | 1          | 5            |
| 11966  | 01  | GEN SET: DED SKD M MEP 802A   |            |                       | 4        |     | 50          | 32         | 36          | 825          | 44          | 2          | 3            |
| M35404 | 02  | RADIO SET HIGH FRE            |            | RADIO                 | 2        |     | 27          | 20         | 40          | 130          | 8           |            | 1            |
| 4862   | 16  | HEATER DUCT TYPE P VB67-GFC3  |            |                       | 1        |     | 56          | 33         | 55          | 450          | 13          |            | 1            |
| 28601  | 01  | FIELD FEEDING KIT COMPANY LV  |            |                       | 14       | R   | 254         | 91         | 93          | 5480         | 2247        | 38         | 435          |
| L28351 | 03  | KITCHEN FIELD TLR MFK75A      |            |                       | 7        | R   | 178         | 93         | 94          | 4200         | 805         | 15         | 158          |
| 4154   | 02  | RANGE OUTFIT FIELD M59        |            |                       | 14       |     | 27          | 24         | 42          | 253          | 63          | 2          | 6            |
| 3399   | 04  | SANITATION CENTER             |            | DRAIN TABLE           | 7        |     | 49          | 27         | 38          | 41           | 64          |            | 5            |
| 33399  | 08  | SANITATION CENTER             |            | WORK TABLE            | 7        |     | 56          | 26         | 38          | 57           | 71          |            | 6            |
| T07679 | 01  | TRK UTIL,HVY M800V M1097      |            |                       | 6        | R   | 191         | 86         | 72          | 5600         | 684         | 17         | 103          |
| 1494   | 04  | TRK UTIL CRG/TRP C M998       |            |                       | 22       | R   | 181         | 84         | 53          | 5280         | 2323        | 58         | 256          |
| 19950  | 01  | TANK UNIT LIQ DSPN TK LIQ DIS |            |                       | 1        |     | 73          | 61         | 56          | 410          | 31          |            | 4            |
| V48441 | 02  | TENT FRAME TYPE MA            |            | FRAME SECTIONS        | 1        |     | 133         | 29         | 26          | 605          | 27          |            | 1            |
| 8441   | 03  | TENT FRAME TYPE MA            |            | FRAME SECTIONS        | 1        |     | 188         | 21         | 21          | 615          | 27          |            | 1            |
| 8441   | 04  | TENT FRAME TYPE MA            |            | FRAME SECTIONS        | 3        |     | 134         | 12         | 25          | 274          | 34          |            | 2            |
| M32730 | 01  | SHOP EQUIP AUTHV L S/E AUTO C |            |                       | 1        |     | 167         | 87         | 84          | 4460         | 101         | 2          | 18           |
| M55537 | 02  | TRAILER CARGO 3/4 M101A1      |            |                       | 4        | R   | 147         | 74         | 50          | 1350         | 302         | 3          | 31           |
| 5811   | 02  | TRAILER CARGO 1-1/ M105A2     |            |                       | 2        | R   | 166         | 83         | 55          | 2670         | 191         | 3          | 22           |
| M98825 | 23  | TRAILER TANK WATER M149A2     |            |                       | 7        | R   | 162         | 81         | 81          | 2912         | 638         | 10         | 108          |
| Z40439 | 02  | TRUCK CARGO 5 TON MTV W/E     |            |                       | 10       | R   | 275         | 96         | 102         | 32207        | 1833        | 161        | 390          |
| 0712   | 01  | TRLR CGO MTV W/DPS NONE       |            |                       | 1        | R   | 220         | 96         | 58          | 4733         | 147         | 2          | 18           |
| Z222X  | 99  | Total Accompanying Supply --  |            |                       |          |     |             |            |             | 28735        | 180         | 14         | 36           |
| Z222ZY | 99  | Total Ammunition -----        |            |                       |          |     |             |            |             | 1664         | 4           | 1          | 1            |
| Z222Z  | 99  | Total Aggregate TOE * ---     |            |                       |          |     |             |            |             | 53533        | 424         | 27         | 85           |
|        |     |                               |            |                       |          |     |             |            |             |              | 10526       | 359        | 1716         |

Aggregate TOE consists of all items less than 72 inches long by 72 inches wide by 35 inches high and is assumed to be stacked to a height of 96 inches

**APPENDIX B**

**(U) RAIL CLEARANCE DIAGRAMS**

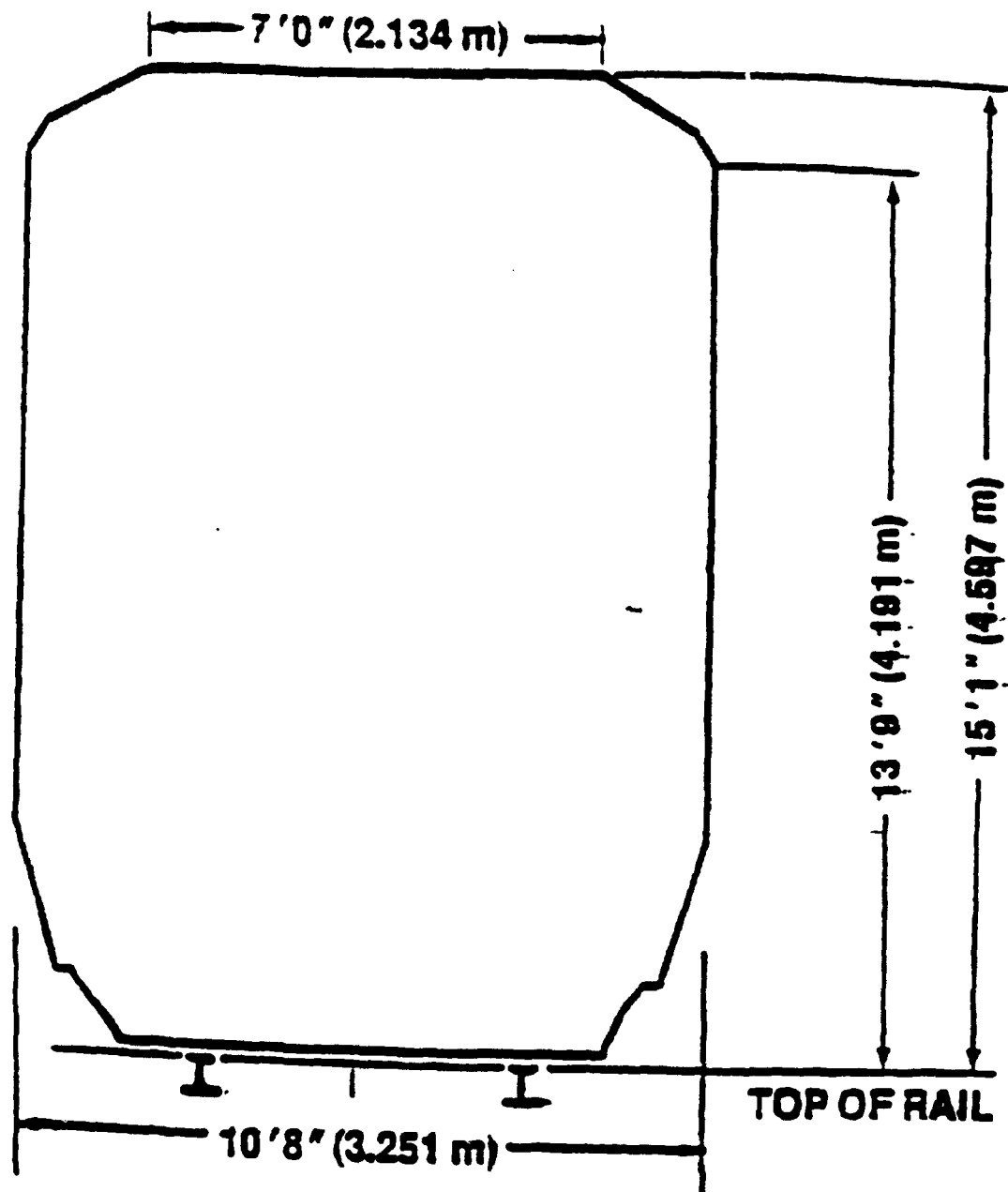


Figure B-1 (U)  
Association of American Railroads (AAR)  
Clearance Diagram

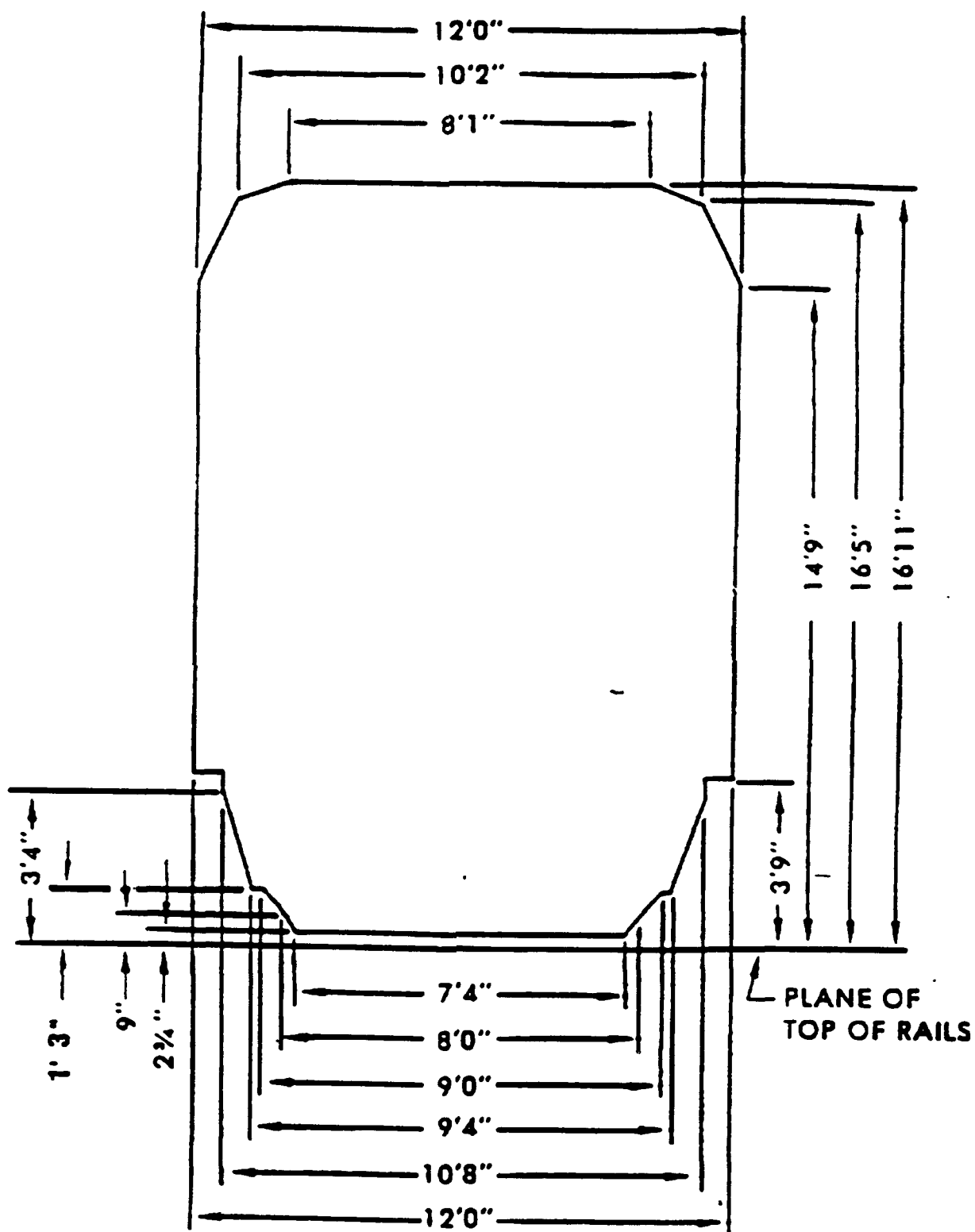


Figure B-2 (U)  
Department of Defense (DOD)  
Clearance Diagram

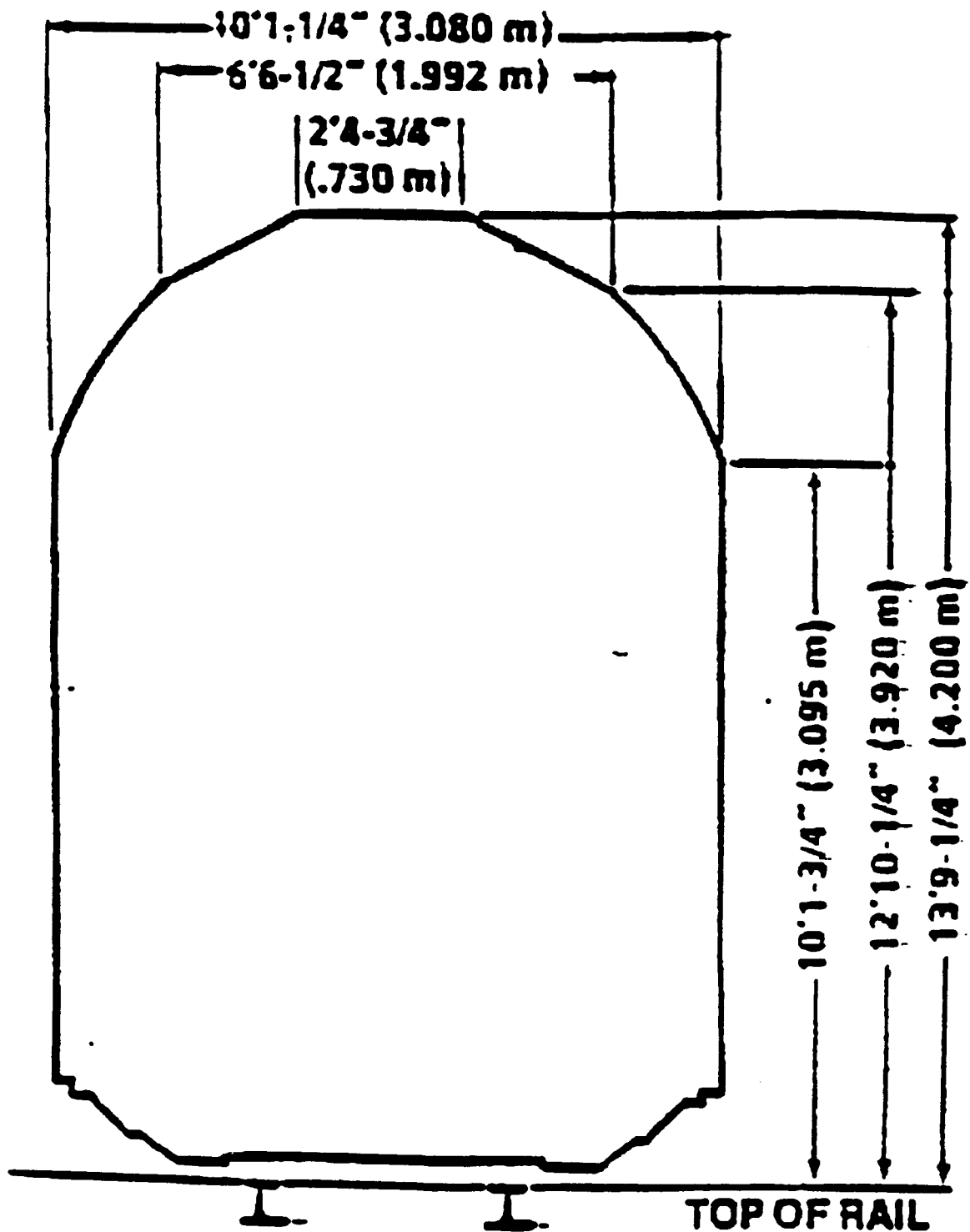


Figure B-3 (U)  
Garbarit International De Chagement  
Clearance Diagram

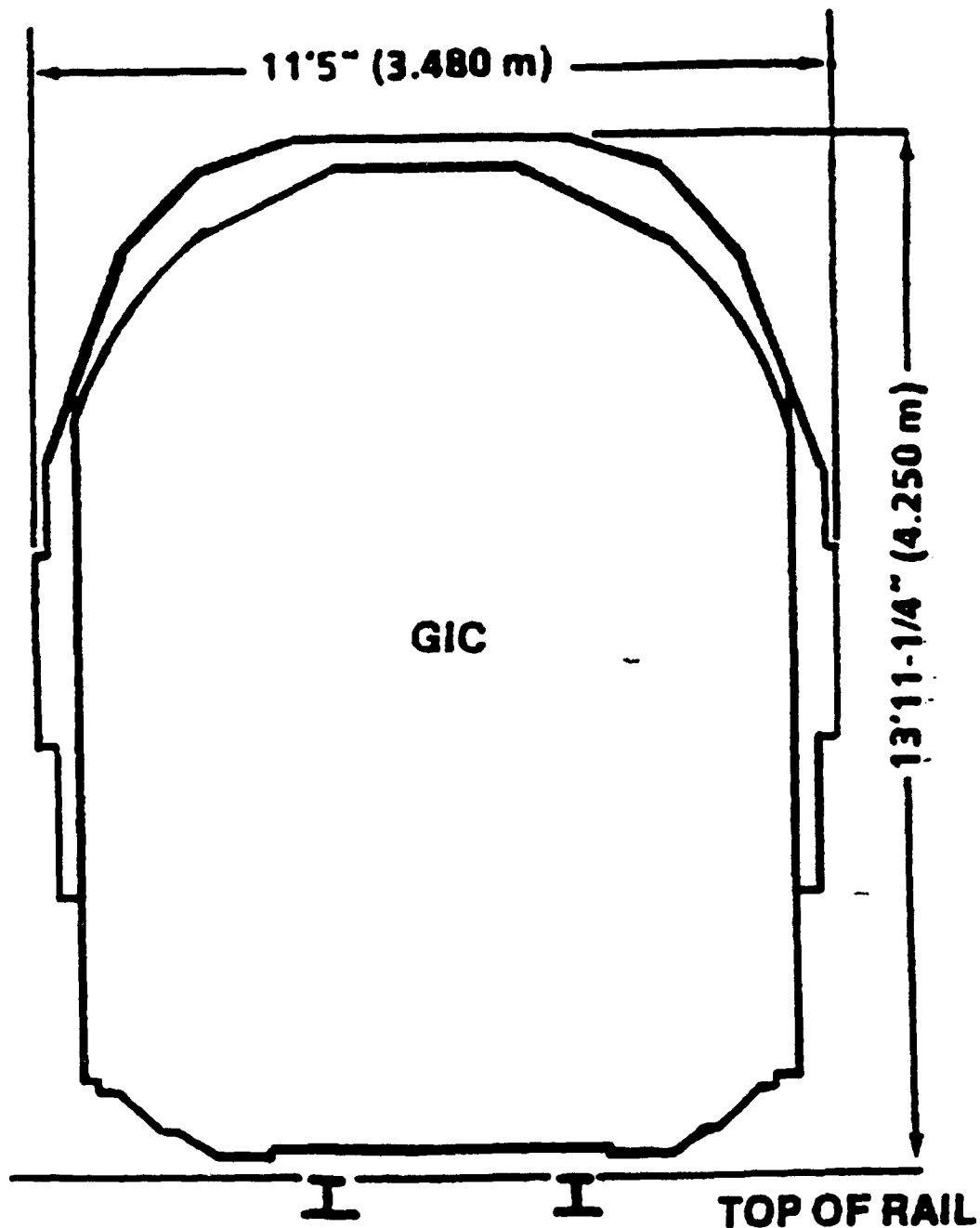


Figure B-4 (U)  
Envelope B

